

# NETWORK WORLD

The Newsweekly of User Networking Strategies

Frame Relay Buyer's Guide  
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## Edify system to automate info delivery

By Timothy O'Brien  
West Coast Bureau Chief

SANTA CLARA, Calif. — Start-up Edify Corp. this month will unveil a network tool designed to automate sales, service and support operations.

The product, The Edify Information Agent, is a microcomputer-based system that uses a variety of network technologies — including electronic mail, terminal emulation, voice response and facsimile — to satisfy user queries for data scattered across multiple systems.

The tool can also be used to automate tasks that previously had been done by a clerk or customer service agent.

"Edify's product was designed to get information to users when and where it's needed," said Jeffrey Crowe, Edify's president and a former executive at IBM and Rolm Co.

Edify, formed two years ago and bankrolled with almost \$9 million in private venture capital, is staffed by former executives and engineers from IBM, Rolm, Metaphor Computer Systems Corp., Oracle Corp., Sybase, Inc. and 3Com Corp.

Its mission, Crowe said, is to integrate data communications, (continued on page 8)



PHOTO © 1992 WALTER CALAHAN

Winners on deck: TI, Columbia Gas net execs wait to receive Network World's User Excellence Awards at ComNet. See page 4.

## ATM emerging as common transport for LANs, WANs

By Barton Crockett  
Senior Editor

WASHINGTON, D.C. — Users, vendors and industry gurus last week rallied around a new consortium promoting Asynchronous Transfer Mode (ATM) as a common transport technology for local-, metropolitan- and wide-area networks.

The ATM Forum — founded in October by Adaptive Corp., Cisco Systems, Inc., Northern Telecom, Inc. and US Sprint Communications Co. — last week announced more than 40 new members, including Bear, Stearns & Company, Inc., Digital Equipment Corp., Hughes LAN Systems, Inc., MCI Communications Corp., Sun Mi-

crosystems, Inc. and Ungermann-Bass, Inc.

The forum wants to accelerate ATM adoption by developing common implementation specifications. Vendors are flocking to the group as they gear up to introduce ATM-based products, the first of which are expected to be LAN hubs scheduled for introduction this year, said John McQuillan, president of McQuillan Consulting in Cambridge, Mass.

McQuillan, an auditing member of the ATM Forum, predicted the industry consortium could be more successful than the Frame Relay Forum in getting vendors to back a new technology. "Al-

(continued on page 44)

## IBM lays out APPN plan for mainframes

VTAM/NCP support to complete APPN rollout; moves promise to ease network administration.

By Paul Desmond  
Senior Editor

WASHINGTON, D.C. — IBM last week provided new details on how it will roll out support for APPN on its mainframes and front-end processors early next year, a development that will all but topple SNA's hierarchical structure.

Although IBM made no specific product announcements, company officials speaking at ComNet here said support for Advanced Peer-to-Peer Networking will be announced for VTAM and the Network Control Program (NCP) later this year and will begin shipping late this year or early 1993.

Mainframes are the last Systems Application Architecture platform to be outfitted with APPN and are the most important in terms of providing the ease of network administration and routing freedom that APPN promises.

IBM also detailed how it will protect users' current 3270-based applications and provide a migration strategy to APPN. NCP, the control software for IBM front-end processors, will be able to simultaneously support APPN and logical units that are depen-

dent on the host for routing, such as LU 0 and LU 2. Additionally, the company said APPN support for dependent logical units, in-

(continued on page 8)

### INSIDE



PHOTO © 1992 WALTER CALAHAN

3Com's Benhamou makes global moves. See page 6.

## SPAG devises tough OSI test program

By Ellen Messmer  
Washington Correspondent

WASHINGTON, D.C. — A European vendor consortium dedicated to open systems has launched an ambitious testing program to certify interoperability between Open Systems Interconnection products, *Network World* has learned.

Nine vendor members of the Brussels, Belgium-based Standards Promotion and Application Group (SPAG) — including IBM, Digital Equipment Corp., Hewlett-Packard Co. and Siemens Nixdorf Informationssysteme AG — conceived the program to work out interoperability discrepancies that have plagued OSI products.

SPAG plans to officially unveil the program, called the Process to Support Interoperability (PSI), at the end of March. Under the program, SPAG will issue PSI (continued on page 45)

### NETLINE



**US SPRINT, WILTEL** announce systems for managing voice/data services from a single workstation. Page 2.

**BBN UNWRAPS PAD** with integral routing functions. Page 2.

**U.S., EUROPEANS** could end up at odds over debate on radio spectrum reallocation. Page 4.

**SYSTEMS CENTER OFFERS**

centralized manager for token-ring LANs. Page 4.

**FCC MAY FORCE** nondominant carriers to file tariffs for all contract services. Page 4.

**NETWARE 3.11 USERS** can now off-load routing functions to dedicated PC. Page 4.

**DEC UNVEILS** terminals servers, OSI software. Page 6.

### NEWS FEATURE



## User analyzes pros, cons of new IBM bridge/router

By Stephen Simon  
Special to Network World

IBM's new multiprotocol bridge/routers promise to have a significant impact on IBM Systems Network Architecture users ("IBM launches line of SNA-ready routers," NW, Jan. 27.).

Network World asked The Travelers Corp. to evaluate the strengths and weaknesses of the 6611 routers.

Like many other large IBM network customers, we have long awaited IBM's entry into the router market, and now we want to know if IBM's late entry is worth the wait.

We haven't tested a model of the 6611 Network Processor yet, but The Travelers and other customers were briefed in depth (continued on page 46)

BEHIND THE NEWS



# US Sprint, WilTel unveil net management systems

Carriers work to enable users to manage voice and data services from an on-site workstation.

By Bob Wallace  
Senior Editor

WASHINGTON, D.C. — US Sprint Communications Co. and WilTel last week announced net management systems that will eventually enable their respective customers to manage voice and data services from a single workstation.

US Sprint's Insite Executive allows users to manage 800 call routing and assign calling privileges for voice services, among other features. The carrier has vowed to add Simple Network Management Protocol support for network device management and links to IBM's NetView.

WilTel's WilView provides on-

line access to the carrier's internal management systems for trouble tracking as well as circuit inventory for its private-line services. Both systems debuted at ComNet.

"Insite Executive is a foundation for managing all Sprint's services," said Chris Finn, an associate with TeleChoice, Inc., a Montclair, N.J., consulting firm. And "WilView is one of the most comprehensive [systems] for private-line management today."

Insite Executive runs on a Sun Microsystems, Inc. SPARCstation that supports the X Window System and the Open Software Foundation, Inc.'s Motif graphical user (continued on page 8)

# Bell Atlantic files nation's first SMDS service tariff

Signs on GSA as initial commercial customer.

By Anita Taff  
Washington Bureau Chief

WASHINGTON, D.C. — Bell Atlantic Corp. announced last week that it has begun selling a scaled-down version of Switched Multimegabit Data Service (SMDS) and that its first commercial customer is the General Services Administration.

Bell Telephone Co. of Pennsylvania, a subsidiary of Bell Atlantic, got approval for a trial tariff it filed last fall and is selling the GSA a service referred to as "pre-SMDS." Bell Atlantic officials said this is the first SMDS tariff filed by a regional Bell holding company and the GSA is the first commercial SMDS customer in

the country.

The service is based on the SMDS standard, but lacks some of the features and capabilities found in the full standard, said Mara Spaulder, SMDS implementation coordinator at Bell Atlantic. She said that such features as billing options, address screening, customer network management and multiple addresses on a single network interface are not yet available.

Bell Atlantic's SMDS service is based on the Metropolitan Area Network Switch (MANS) from Siemens-Stromberg Carlson. The carrier has two switches in Philadelphia and three in Pittsburgh.

(continued on page 47)

# BBN announces suite of new products at ComNet

By Jim Duffy  
Senior Editor

WASHINGTON, D.C. — BBN Communications Corp. last week at ComNet unveiled a packet assembler/disassembler with integrated routing capabilities, as well as new management software for its packet switches and a consulting service designed to help users cut network costs.

BBN's T/10 Integrated Access Device is the first in a family of products designed to aid users in the transition from IBM Systems Network Architecture and X.25 nets to multiprotocol internetworks, the company said.

The offering combines PAD, switching and routing capabilities in one system that is designed to provide access to T-1 links now and broadband services in the future through software and hardware upgrades.

A number of packet-switch vendors, including Hughes Network Systems, Inc., Northern Telecom, Inc. and Racal-Datacom, Inc., have been rolling out access switches, PADs and routers to address demand for consolidating multiple traffic types from remote sites onto corporate backbone networks.

(continued on page 47)

## Briefs

### Exec envisions "information malls."

In his keynote address at the ComNet conference in Washington, D.C. last week, George Heilmeier, president and chief executive officer of Bell Communications Research, said the U.S. needs an information infrastructure that will support universal user access to "information malls," which would contain entertainment, shopping, medical, business and educational information. Heilmeier called on Congress to create a cohesive national policy on standards and provide tax incentives for industry investment in such a plan. He said Sen. Al Gore's (D-Tenn.) High-Performance Computing Act of 1991 is not sufficient to meet the the goals envisioned.

**NREN funds reduced.** The National Research and Education Network will receive \$123 million in funding next year out of the total \$803 million for the entire High-Performance Computing and Communications (HPCC) program under President Bush's 1993 budget unveiled last week. In response to the Computer Systems Policy Project, which said the HPCC program needed to emphasize software research and development, the president shifted \$68 million in spending from hardware to software. Officials emphasized that the federal government only intends to fund a gigabit network prototype, not an operational network.

**IBM FEPs in frame relay demo.** IBM last week demonstrated at the ComNet show frame relay connections between its 3745 Communication Controller and frame relay nets operated by MCI Communications Corp. and Sprint Data Group. In the MCI demonstration, IBM front-end processors were linked to Wellfleet Communications, Inc. routers in MCI's network, which repackaged the data into a cell relay format. The cell relay strategy will allow MCI to support frame relay at speeds ranging from 19.2K to 45M bit/sec, whereas other carriers currently top out at 2.048M bit/sec.

**Northern Telecom bans snooping.** Northern Telecom, Inc. last week announced a corporate policy banning undisclosed electronic monitoring of employees. The policy, which was first communicated to Northern Telecom managers in November, forbids managers and employees from

conducting "undisclosed monitoring of employee voice, video and data communications." This would include monitoring electronic mail files without notifying employees. The Communications Workers of America, which has been pushing for legislation to stop undisclosed electronic monitoring in the workplace, hailed the policy as "an historic breakthrough in the protection of privacy."

**Who ya gonna call? JitterBuster!** Protheon, Inc. last week published a paper describing its JitterBuster technology that it hopes to get included in the emerging IEEE 802.5 standard for 4M and 16M bit/sec token ring over unshielded twisted-pair wire. The technology, along with a joint submission by IBM and SynOptics Communications, Inc., is being considered for inclusion in the standard. The Institute of Electrical and Electronics Engineers, Inc. group working on the standard met last week in Santa Clara, Calif.

**IBM to the rescue.** IBM last week beat out Hewlett-Packard Co. on a bid to become the French government's partner in a project to prop up Groupe Bull SA, the ailing computer company owned by the French government. Under the agreement, IBM will pour an estimated \$100 million into Groupe Bull for an equity stake of between 5% and 10%. The deal also calls for the companies to license various network technologies to each other, including work based on Open Systems Interconnection and Systems Network Architecture.

**Concord adds analyzer module.** Concord Communications, Inc. is expected to unveil today a protocol analyzer module for use with its Trakker internetwork management system. When installed in the same Sun Microsystems, Inc. SPARCstation as Trakker, the module will enable users to filter, trace and decode eight protocols, including the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s NetWare, IBM's Systems Network Architecture/Network Basic I/O System, Apple Computer, Inc.'s AppleTalk, Banyan Systems, Inc.'s VINES, Xerox Corp.'s Xerox Network Systems and Open Systems Interconnection protocols. The Trak/Trace module costs \$8,000.

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# Battle over radio spectrum shaping up for WARC meet

U.S., Europeans seek reallocation of bandwidth.

By Ellen Messmer  
Washington Correspondent

MALAGA-TORREMOLINOS, Spain — Representatives from nations worldwide will meet here this week in what is shaping up as a month-long battle over global radio spectrum and new mobile communications services.

The U.S. is sending its 54-member delegation to the World Administrative Radio Conference (WARC) to fend off a European push for a new global bandwidth allocation for personal communications network (PCN) services.

In addition, the U.S. delegation will be spearheading a drive

to reallocate radio spectrum to support low-earth orbit satellites (LEO), without which Motorola, Inc.'s Iridium project appears doomed.

Jan Baran, chairman of the U.S. WARC delegation and the country's ambassador to the conference, last week discussed the U.S.'s priorities, emphasizing that the delegation hopes to return from the conference with a new frequency allocation for LEOs, a satellite system which could deliver voice and data services to handheld devices.

The U.S. is asking for 1610 MHz to 1626 MHz for a LEO system uplink and 2483.5 MHz to

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2500 MHz for the downlink.

Speaking at a Department of State briefing last week, Baran said other countries have not expressed outright opposition to the U.S. LEO proposal. "However, there is concern it would re-

(continued on page 44)

# Systems Center airs mgmt. tool for token-ring LANs

By Paul Desmond  
Senior Editor

WASHINGTON, D.C. — Systems Center, Inc. last week unveiled a LAN management system that works in conjunction with its host-based Net/Master Systems Network Architecture management tool to centrally control dispersed token-ring LANs.

At the ComNet show here, the company also unveiled, as expected, Net/Master's first graphical user interface (GUI).

Systems Center's new Solve:LAN for OS/2 runs on local-area network servers based on either IBM OS/2 Extended Edition or Microsoft Corp.'s OS/2, meaning it will work in conjunction with either IBM's LAN Server or Micro-

soft's LAN Manager. IBM's comparable token-ring management tools — LAN Manager and LAN Network Manager — support only IBM's LAN Server.

Solve:LAN for OS/2 addresses hardware problems, such as checking the status of a LAN segment and the path between two adapters. It can also log configuration changes, monitor and remove adapters and edit adapter configurations.

Many functions, such as configuration changes, can be performed from a host-based Net/Master console. Solve:LAN for OS/2 can send 21 alerts to the host with status, cause and recommended action data. That enables users to take advantage of

Net/Master automation facilities to address LAN problems.

Systems Center's new GUI, dubbed Net/Monitor, is based on IBM's Presentation Manager user interfaces. When it ships in the second quarter, the GUI will support both monitoring and control of devices in SNA nets ("Systems Center maps new Net/Master plan," *NW*, Dec. 30/Jan. 6).

IBM's OS/2-based GUI for NetView, the Graphic Monitor Facility, currently supports only monitoring, although IBM has announced support for control.

Both Net/Monitor and Solve:LAN for OS/2 are now available on a limited basis with general availability scheduled for the second quarter. Solve:LAN costs \$3,500 per copy for each token-ring LAN to be managed. Net/Monitor pricing varies depending on the number of workstations used, but a five-console configuration costs about \$14,000. □

# Novell offers software to develop dedicated router

Firm also extends development deal with Compaq.

By Caryn Gillooly  
Senior Editor

SAN JOSE, Calif. — Novell, Inc. last week unveiled software that will enable users to off-load basic routing functions from a NetWare 3.11 server to a dedicated router.

As expected, the vendor also announced NetWare Loadable Modules (NLM) to manage and control intelligent hub cards in a NetWare server and expanded a joint development deal with Compaq Computer Corp.

The NetWare Multi-Protocol Router Version 1.0 is software that allows users to move routing operations from a NetWare 3.11

server onto a dedicated personal computer positioned as a low-end local-area network router.

By off-loading routing functions from the NetWare server, users can improve server performance for file and print services, according to Navin Jain, vice-president and general manager of Novell's Internetworking Product Division, based here.

## Then and now

"Before, you had to have these [routing] capabilities on your server," Jain said. "Now you can split the functionality without buying a more advanced — and expensive — product."

Novell will still offer the routing functions as standard features in NetWare 3.11, he added.

Initially, the router software will support only Novell's Internetwork Packet Exchange (IPX), the Internet Protocol and Apple Computer, Inc. AppleTalk protocols, Jain said. The software will run on any Intel Corp. 80386 or higher PC, and the router's performance will be based on the power of the hardware on which it resides.

According to Jain, future releases are expected to include support for Open Systems Interconnection and IBM's System Network Architecture. Novell will also include support for wide-area networking services such as frame relay and Switched Multi-megabit Data Service.

"The 64K [bit/sec] and T-1 capabilities now available for IPX will be extended to all other pro-

(continued on page 45)

# FCC agrees to reconsider legality of its tariff rules

By Anita Taff  
Washington Bureau Chief

WASHINGTON, D.C. — After 2½ years of legal wrangling and prodding by AT&T, the FCC last week agreed to reexamine its rules exempting nondominant carriers from filing tariffs.

The Federal Communications Commission rejected an AT&T complaint filed in 1989 in which the carrier sought damages from MCI Communications Corp. for luring away some AT&T customers with off-tariff deals.

But the agency agreed to open a proceeding to examine the legality of its rules that exempt AT&T's rivals from filing tariffs.

The outcome of this proceeding could fundamentally alter the rules that have governed the long-distance industry for the past 10 years. Nondominant car-

riers, such as MCI and US Sprint Communications Co., could again be required to file tariffs for all services, including custom network deals, which are currently done through contract.

Forcing these carriers to file tariffs for custom network deals could cause regulatory delays for customers and open their networks to public scrutiny.

AT&T expressed disappointment in the decision, saying the FCC should have acted on its complaint rather than go through an elaborate proceeding.

Rival carriers had mixed reactions. Donald Elardo, counsel for MCI, said dismissal of AT&T's complaint was a major victory, though he acknowledged there is a real danger the nondominant rules could be overturned.

(continued on page 6)

# Network World honors User Excellence winners

WASHINGTON, D.C. — Network executives last week took time out to honor their own at a special ComNet presentation of *Network World's* annual User Excellence Awards.



TI's George Chrisman (with award) and net colleagues

In a ceremony preceding the keynote address by George Heilmeier, president and chief executive officer of Bell Communications Research, Inc., top network officials from Texas Instruments, Inc. and Columbia Gas Transmission Corp. accepted *NW's* Seventh Annual User Excellence Awards.

TI was recognized for building an enterprise network that



Columbia Gas' Bruce Cavender

spans 30 countries, streamlining design and manufacturing while helping the company reach out to customers and sup-

pliers. TI's net team has a rigorous commitment to quality and has achieved virtually 100% network uptime.

Columbia Gas Transmission was cited for its commitment to network innovation, even in the face of serious financial troubles. Although its parent company, Columbia Gas System, Inc. has filed for bankruptcy protection, Columbia Gas Transmission has undertaken an ambitious \$21 million network upgrade designed to make the company more competitive.

Cited for honorable mentions were Copperweld Corp.; Central Fidelity Bank; Covia Partnership; Teledyne Brown



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TI's Chrisman accepts award.

Engineering; New York's Computer and Data Communications Service Agency and the U.S. Bureau of Export Administration.

"Unlike other publications, we don't honor products. We honor people," said *Network World* Editor John Gallant in presenting the awards. "These people prove what we preach — that networking can help you achieve your strategic objectives." □



# WHY BRITISH AEROSPACE FLIES WITH GDC.

British Aerospace chose General DataComm to link its vast resources and increase operational efficiency through an integrated voice, data, and video Wide Area Network.

This was no mean feat considering British Aerospace is one of the world's largest manufacturing companies with 125,000 employees throughout Europe and North America.

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# In global push, 3Com buys data net unit of BICC

By Caryn Gillooly  
Senior Editor

WASHINGTON, D.C. — 3Com Corp. last week built on its global data networking vision with the acquisition of BICC plc's data network products division.

If the deal goes through, it would catapult the onetime network operating system vendor into the fourth largest hub vendor behind SynOptics Communications, Inc., Cabletron Systems, Inc. and Unger-

range hub line to augment 3Com's existing high- and low-end hub offerings and a 16-bit Ethernet bus master adapter that will join 3Com's line of adapter cards. "Users with large-scale applications are going to find [more versatile] solutions with ISO-LAN rolled into 3Com's product line," said Tom Nolle, president of CIMI Corp., a technical assessment and strategic planning company based in Voorhees, N.J.

3Com currently markets the MultiConnect and LinkBuilder 10Base-T hubs at the low end, and the LinkBuilder 3GH at the high end. And it had an OEM agreement with SynOptics for its mid-range LinkBuilder products.

3Com and SynOptics recently agreed to terminate their OEM partnership, under which 3Com resells SynOptics' System 3000 wiring hubs. 3Com will continue to sell the SynOptics gear until October and provide support for five years after that.

Under the terms of the agreement, 3Com will pay \$25 million cash as well as 500,000 shares of its common stock to BICC Communications. The deal is expected to be completed early this month, at which time BICC Communications will become 3Com's Premises Distribution Division. Janice Roberts, currently president of BICC Communications, will serve as the division's vice-president and general manager.

Analysts said the product lines and sales organizations of BICC and 3Com are complementary. As Europe's largest hub manufacturer, the BICC division gives 3Com a greater global presence. "BICC is a household word in Europe — it's like the Frigidaire of networking," said Eric Benhamou, 3Com's president and chief executive officer. "Acquiring BICC is a major step forward in fulfilling our global data networking vision."

According to Todd Dagres, director of data communications research at The Yankee Group, a market research firm in Boston, "3Com is buying market share in Europe. That's a good move." □

Bob Brown contributed to this story.

"BICC is a household word in Europe — it's like the Frigidaire of networking," said Eric Benhamou, 3Com's president and chief executive officer.



mann-Bass, Inc., respectively, according to analysts. Before the acquisition, 3Com just made analysts' top 10 lists.

The deal could dramatically heighten 3Com's visibility in the international hub market. The BICC division, which is Europe's largest hub maker and distributor, specializes in Ethernet and Fiber Distributed Data Interface products. It sells the EtherConnect System structured wiring hubs, and ISOLAN repeaters, adapters, transceivers, low-end bridges and a network management system.

BICC's network division brings a mid-

# DEC releases pricing information on DECnet/OSI for VMS software

By Jim Duffy  
Senior Editor

WASHINGTON, D.C. — Digital Equipment Corp. disclosed at ComNet here last week pricing and availability of DECnet/OSI for VMS, software that enables systems based on DEC's most widely installed operating system to participate in multivendor networks that adhere to Open Systems Interconnection standards.

DEC also introduced a line of terminal servers, some of which support concurrent Local Area Transport (LAT) and Transmission Control Protocol/Internet Protocol sessions. The products are intended to offer users flexibility in installing and configuring DECnet environments by supporting access to systems and data from multiple vendors through standards such as OSI and TCP/IP.

"This is a fulfillment of commitments we've made along the way," said Gail Daniels, DEC's director of Networks marketing.

DECnet/OSI for VMS Version 5.5 implements DECnet and OSI protocols for the vendor's VMS operating system. DECnet/OSI integrates layers of the OSI stack, such as the physical, data link, network and transport layers, with upper layer DECnet protocols. Version 5.5 systems can now share data with other OSI-compliant systems via OSI protocols or other DECnet nodes via DECnet. The software complements a similar offering that DEC introduced for Ultrix last June.

DECnet/OSI for VMS complies with the U.S. and the U.K. Government OSI Profile requirements and supports the OSI Virtual Terminal Protocol for access to remote systems and applications.

It also supports X.25, asynchronous and synchronous data links, File Transfer, Access and Management (FTAM) for file access with other FTAM systems, a gateway between FTAM and DECnet's file-transfer application, and DEC's distributed naming and time services.

However, the software does not support host-based routing, so DECnet/OSI for VMS systems can only be configured as end nodes in a net and cannot be used as rout-

ing nodes. Data can originate and terminate at end nodes, but data destined for other nodes cannot transit end nodes. Therefore, DECnet/OSI for VMS hosts need to access routers or other full-function routing nodes in a DECnet/OSI net.

DEC is considering making VMS systems full-functional DECnet/OSI routing nodes.

DECnet/OSI for VMS 5.5, priced from \$485 to \$22,000, will be available in June.

DEC's new terminal servers announced last week include the DECserver 700 line for Ethernet local-area networks, the MUXserver 320 and 380 for remote device support, and the DECserver 90L+ work group terminal server, which can reside in the DEChub 90 concentrator.

The DECserver 700 connects video terminals, serial printers, modems, data switches and personal computers on Ethernet LANs to DEC hosts using LAT and TCP/IP Telnet protocols. The 700 is available in two models — one supporting eight ports and another supporting 16 connections.

The DECserver 700 replaces the DECserver 200 and 300 products. The eight-port device costs \$3,000, while the 16-port server costs \$3,800. Both configurations are avail-

able now.

The MUXserver 320 and 380 terminal servers are designed for remote DECmux 300 servers, which transmit data over synchronous links using LAT and Telnet. The MUXserver 320 can connect as many as 32 users at two remote sites, while the 380 can connect as many as 128 users at eight sites. The MUXserver 320 costs \$4,400, and the MUXserver 380 is priced at \$8,230. Both will be available this month.

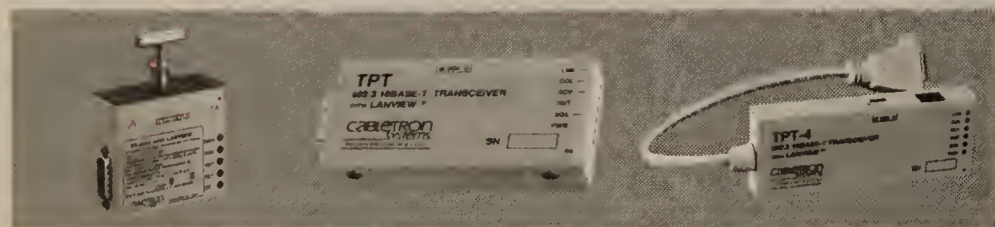
The DECserver 90L+ is an eight-port LAT terminal server that connects PCs, video terminals and serial printers to DEC VMS and Ultrix hosts via Ethernet. It supports up to four LAT sessions per port and priority connections for specified users.

Stand-alone versions of the DECserver 90L+, which replaces the DECserver 90L, cost \$1,450. A rack-mountable version is priced at \$1,275. Both models are available now. □



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Gail Daniels

## ETHERNET COAX TRANSCEIVERS 10BASE-T TRANSCEIVERS



### COAX TRANSCEIVERS ST-500

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## FCC to reconsider tariff legality

continued from page 4

US Sprint was more confident in the stability of the rules. After 10 years, "I don't see any basis to overturn [the rules]," said Leon Kestenbaum, counsel for US Sprint. He said forcing the more than 400 non-dominant carriers that exist today to start filing tariffs again would be incredibly wasteful and would hurt competition.

AT&T argued that the Communications Act of 1934 requires carriers to file tariffs and said the FCC overstepped its authority by exempting smaller carriers from that requirement. The carrier also said this asymmetrical regulation is a serious disadvantage in competing for large customers. AT&T must file tariffs outlining prices,

terms and conditions of its custom network deals, while rivals do not.

In August 1989, AT&T charged that MCI illegally won the business of six customers by offering deals with special terms and rates not listed in tariffs.

Last week, the FCC threw out AT&T's complaint, saying the carrier could not seek damages from MCI for following FCC rules allowing it to operate without tariffs. The FCC refused to stop smaller carriers from selling custom nets through contract.

But the FCC acknowledged there are some legal questions about its rulings, known as the Competitive Carrier decisions, that gradually lifted tariff requirements from nondominant carriers.

The agency said it will examine whether all nondominant carriers should have to file tariffs. □



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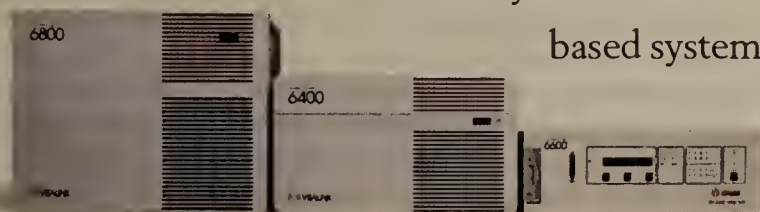
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## Tool to automate info delivery

*continued from page 1*

voice processing, database and object-oriented technology into a single system capable of automatically retrieving data for users.

In its initial release, The Edify Information Agent will be offered as a turnkey system, with a primary software module and related software development tools bundled onto a private-labeled Intel Corp. 80486-based personal computer supporting OS/2 Extended Edition.

As released, Edify will be able to communicate with systems from Digital Equipment Corp. and Hewlett-Packard Co., but eventually the vendor will add support for access to IBM hosts, as well as support for Microsoft Corp. LAN Manager and Novell, Inc. NetWare nets.

The heart of the system is the product's Agent Server module, which executes so-called software agents developed with Edify's Agent Maker.

Agent Maker is a set of object-oriented development tools that enables users to create routines that can be used to automate responses to specific queries and conditions.

The Agent Maker comes with a graphical user interface that lets users visually map out a sequence of events, such as monitoring inventory levels and placing orders with suppliers when inventories dip, by linking objects that represent those tasks.

The Agent Maker then interprets these process instructions and builds the program — the software agent — to automate

the process.

A software agent, for instance, can automatically establish terminal-emulation sessions to local or remote hosts in order to access data and return it to the system, which then reformats it for delivery by a myriad of options, including E-mail, facsimile or digitized voice.

For instance, in a sales application, the Edify Information Agent can be set up to send customer and distributor credit status automatically via E-mail to company sales managers every week.

The Edify Information Agent



Edify's Charles Jolissaint (left) and Jeffrey Crowe

station will also support IBM's Communications Manager and Database Manager as well as other terminal emulation products.

The Communications Manager support will allow the software agents to access other devices on LANs throughout a company, as well as provide the means to establish sessions with multiple hosts.

The Database Manager will enable users to access SQL-based databases, as well as enable the database to support voice and image data.

Analysts said the product is a novelty.

"I believe they have something no one else is doing, especially in the way they have incorporated telephony and fax capabilities instead of just relying on electronic mail," said Peter Kastner, vice-president of The Aberdeen Group, Inc., a consulting firm in Boston.

According to Gerald Michalski, an analyst with New Science Associates, Inc. in Southport, Conn., Edify has done a good job architecting the product.

"This technology will not only be a labor replacer — automating repetitive tasks to deliver better customer service 24 hours a day — but also will provide the means for users to open up new applications," Michalski said.

Crowe acknowledged the need to support additional database, network, messaging, telephony and desktop standards as they emerge.

Down the road, Edify plans to offer a client/server version of The Edify Information Agent.

In addition, Edify plans to port the Agent Server software to Unix and Microsoft Windows NT environments, as well as move the Agent Maker software to client platforms, such as Apple Computer, Inc.'s Macintosh, IBM's Presentation Manager and Windows.

Edify said pricing for the system starts at \$60,000. The product, which has been in beta test since the fourth quarter of last year, will ship by the end of March with support for DEC and HP hosts. Versions of the product supporting IBM host and LAN connectivity will be available in the third quarter of this year. ■

## IBM lays out APPN plan

*continued from page 1*

cluding 3270 applications, would be included in VTAM and NCP from the start.

Support for 3270 applications is critical because APPN today supports only LU 6.2 sessions, while 3270 applications typically use LU 2. IBM has said that LU 2 will be wrapped in LU 6.2 to gain APPN support ("IBM's McGee addresses the issues surrounding APPN," *NW*, Dec. 9, 1991).

The major benefit of APPN support on mainframes will be in system administration because it will obviate the need to manually enter path definitions for every device and application, said Mark Pozefsky, program manager of VTAM strategy design and performance at IBM.

IBM, for example, is planning to outfit the more than 50 mainframes in its own internal network's Southeast region with APPN support, Pozefsky said. That will reduce the path definition requirements for that portion of the net by 90%, he added.

John Hunter, director of architecture and telecommunications in IBM's Networking Systems group, said the APPN Network Node function will be split between VTAM and NCP, meaning both will still be required.

It also means a mainframe configured as an APPN end node will still require the use of another VTAM/NCP configured as a network node for session establishment, Pozefsky said. Once a session is established, data can flow directly from an end device to the target host.

IBM hinted it would eventually drop the reliance on the VTAM/NCP combination and allow any network node to route data from a host configured as an end node. "That's very plausible," Pozefsky said.

IBM has shipped or announced Network Node support for OS/2 machines, its Application System/400s, 3174 cluster controllers and its new 6611 Network Processor router.

### User benefits

For users migrating Systems Network Architecture devices to token-ring networks, such as The Travelers Corp. in Hartford, Conn., that choice is important.

"We would prefer to do our switching in a router," said Stephen Simon, engineering product manager for The Travelers, adding that using a router should be cheaper and faster than relying on NCP. "Today, we spend a lot of cycles in NCP doing switching through the network."

According to Hunter, the router option may be forthcoming.

"In the future, that could be a box other than NCP," he said. If the box were a 6611 router, users could channel-attach it to a host via the IBM 3172 Interconnect

Controller and eliminate the front-end processor.

"In theory, the 6611 could replace a 3745," said Jean Lorrain, senior technical staff member of advanced network systems in IBM's Networking Systems. But he noted that front ends provide a number of functions other than routing, including line concentration and support for older protocols such as Binary Synchronous Communications.

IBM also said last week that it is talking to numerous vendors about licensing network node specifications, which could bring even more options for devices useful as switching nodes in an APPN net. A source who requested anonymity said IBM is likely to ship prototype APPN Network Node code with the specification, which should speed the development process for third parties. The specification is expected out late this year or early next year.

IBM positioned the APPN developments as another step toward its ultimate goal of a next-generation SNA based on a gigabit speed, fast-packet backbone capable of supporting data, voice, video and multiple protocols. That will be based on fast packet switches currently under development at IBM's facility in La Gaude, France.

"That's going to take several years [although] I'm not talking about 10 years," Lorrain said.

### Positive reaction

Analysts generally favored IBM's APPN plans but noted some drawbacks.

"My quibble is that NCP will not be a totally independent network node," said Atul Kapoor, principal at Kaptronix, Inc., a consultancy in Haworth, N.J. That means mainframe cycles will still be required for some routing.

That won't always be an issue, he said, since many mainframes are used solely to run applications. They would only need end-node support and could rely on adjacent network node devices for routing.

"The thing I'm not that comfortable about is the efficiency of the architecture," said Anura Guruge, lead consultant at BBN Communications Corp., a consultancy in Cambridge, Mass. "APPN is absolutely sacrilegious in its use of bandwidth" due to the routing overhead it requires.

Simon noted that questions remain about the response time with APPN routing as compared to traditional front-end processors, although he said the OS/2 version has gained high marks for performance.

He was also concerned about the cost of upgrading devices, such as the 3174, to support APPN. According to Hunter, an upgrade to APPN is free to users of Configuration Support-C 3174 software and costs between \$680 and \$1,350 for those with Configuration Support-B code. ■

## Firms unveil net mgmt. systems

*continued from page 2*

interface. A 9.6K bit/sec line links the SPARCstation to a Tandem Computers, Inc. processor that serves as a gateway to the carrier's operational systems.

Insite Executive includes four applications: 800 Call Director, Messaging Manager, Administrative Manager and Tools Manager.

800 Call Director works with US Sprint's Enhanced 800 Service, which enables flexible call routing among multiple call centers. A user can call up a Call Director Routing Map and define routing patterns by region. Routing can also be based on the time of day or date. The carrier can make the changes within 15 minutes.

Insite Executive's Messaging Manager enables system users to exchange electronic messages among themselves or with technicians at US Sprint's National Repair Center in Atlanta.

The Administrative Manager application lets administrators offer employees calling privileges for all US Sprint services.

Tools Manager lets an Insite Executive administrator use other workstation applications.

US Sprint plans to bring other services — including its Virtual Private Network (VPN), WATS, private-line, calling card and public data services — under the system. VPN will not be added until 1993. Other planned applications include Alarm Monitoring, Trouble Monitoring, Traffic Monitoring and Invoice Management.

The carrier will announce a release date for an unspecified number of these services and applications later this year. The initial release of Insite Executive will be available in May for a \$2,240 installation charge and a \$2,000 monthly charge.

US Sprint next year plans to enhance the system to support monitoring of equipment, such as bridges and routers, by using SNMP but would not release details. The company also would not say when the NetView link will be available.

With WilView, an administra-

tor at a Unix, DOS or OS/2 workstation supporting the X Window System and a graphical user interface can obtain on-line access to WilTel's Tracking and Inventory Systems.

WilView can be used to call up circuit inventory, which lists circuit types, end points, the date the circuit was ordered and when it was brought on-line. The inventory also lists the customer premises equipment attached to the line, the vendor contact for each device and the contact names of the telephone companies that provide local access.

WilView can provide a graphical circuit layout map showing the WilTel network. A customer can determine whether the route is only used by WilTel or if other carriers have leased capacity. The system can also be used to open and track trouble tickets.

WilView will be available in April for a onetime \$1,000 fee per site and a monthly rate of \$500 for the first site and \$250 for an additional location. The carrier plans to enhance WilView to enable net managers to control other WilTel services. ■



# INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

## Worth Noting

“With what the Network Management Forum has already done with its Release 1 [of the net management specification] and the [Open Management] Roadmap, we’ve made it possible for vendors to build open management systems and for users to implement them. But we haven’t made these tasks easy. That’s what we’re aiming to do now.”

Bill Gilbert  
President  
NM Forum  
Bernardsville, N.J.

## Group to mold support for binary files over X.400 nets

Goal is to ease file transfer among applications.

By Bob Brown  
Senior Editor

BOSTON — A group of large private E-mail network users and vendors will meet here next week to discuss, among other things, a new plan for easing the transmission of binary files across X.400 networks.

The ability to transmit charts, spreadsheets and other binary or nontext files from personal computer-based applications across electronic mail networks promises to make E-mail increasingly valuable to users.

The issue of transmitting binary files across E-mail nets is coming to light because most E-mail vendors are just now rolling out software that conforms to the 1988 version of the X.400 standard, which has been specially designed to accommodate binary files. The 1988 version’s ability to handle binary files via its Externally Defined Body Part 15 is a major improvement over the widely used 1984 version of X.400, which does not let users easily exchange binary files.

An ad hoc meeting on Body Part 15 two weeks ago attracted representatives from user companies, such as Hughes Aircraft Co., and vendors, such as Digital Equipment Corp. and Microsoft Corp.

The Vendor Day meeting was organized by the Private Management Domain (PRMD) Operators Committee of the Electronic Mail

Association (EMA), an industry trade group based in Arlington, Va.

The PRMD Operators Committee, which was formed last year to promote standard operating procedures among private E-mail network users, used the meeting as a platform to tell vendors how they can help ease the exchange of binary files across X.400 nets. The users are looking for a way to simplify, for example, the process of converting a Lotus Development Corp. 1-2-3 spreadsheet sent over an X.400 E-mail net into another vendor’s spreadsheet format without any intervention from the message sender or recipient.

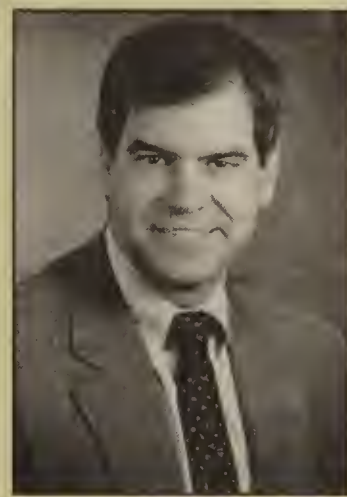
Many users would like to exchange spreadsheets and other binary files but have difficulty accomplishing this in multivendor environments, said Peter Donaghy, manager of customer services and the support laboratory at Hughes Aircraft in Long Beach, Calif.

“What we’re proposing should have a tremendous impact on our ability to have true interoperability down at the applications level,” Donaghy said.

With Body Part 15, binary files are identified by a tag that is read and automatically translated by conversion software running on the E-mail net.

The PRMD Operators Committee told vendors attending the

(continued on page 10)



“Our strategy is to sign the systems vendors on as OEMs and tell them we’ve got it all and they should resell it.”

Andrew Ludwick  
President and CEO  
SynOptics Communications, Inc.  
Santa Clara, Calif.

## SynOptics exec sheds light on vendor ties

CEO Ludwick dismisses rumors of IBM reseller pact, merger with Cisco; offers vision of market.

Q&A According to most market researchers, SynOptics Communications, Inc. of Santa Clara, Calif., leads the pack of intelligent wiring hub suppliers. Andrew Ludwick, SynOptics’ president and chief executive officer, spoke recently to *Network World* Senior Editor Bob Brown about his efforts to keep SynOptics on top of the hub market by working closely with other leading networking vendors, such as Cisco Systems, Inc. and IBM.

**There has been much speculation lately that IBM will sign an agreement with SynOptics to sell your hubs under a private label. Is there any truth to this?**

There is no discussion going on along those lines right now. There’s no contract being negotiated. But there is a great working relationship between us, and there’s a lot of momentum behind it.

Let’s go back two years to the presentations we were making to the financial community, which was asking us who we thought our next competitors would be after the hub vendors, such as 3Com [Corp.], Ungermann-Bass [Inc.] and Cabletron [Systems, Inc.]. The answer was the systems vendors, such as IBM and Hewlett-Packard [Co.]. Our strategy is to sign the systems vendors on as OEMs and tell them we’ve got it all and they should resell it.

We have various types of reseller arrangements in place with DEC and IBM, but we have not been successful in persuading anybody to [private label] our equipment.

We’ve had some big victories in working alongside IBM, such as our contract with American Ex-

press [Co.]. We also helped IBM do something it couldn’t do [by] itself with the 16M [bit/sec token-ring] over [unshielded twisted-pair] technology that we developed together.

As far as anything more than that, we’ll have to wait and see what happens. I’d love to see that kind of business develop, but I don’t know where IBM is with its strategy.

They could be doing a [Controlled Access Unit] follow-up to be a direct competitor to us. If they were doing that, I would argue against it. I would tell them they shouldn’t take the time to develop what is already on the market.

**But one way or another, do you think it’s important for the computer systems vendors to get more involved in the hub market?**

It is significant for IBM and DEC to have an open platform hub. I don’t think the customer is going to be happy with a physical LAN platform that [provides users with little flexibility].

If you were DEC and supported Ethernet but didn’t have good token-ring support and you had semiproprietary network management and the customer’s alternative was to go to SynOptics to get the whole thing, I think we’d win a significant share. The same goes for IBM.

**Because SynOptics has a close working relationship with Cisco, there has also been speculation that SynOptics and Cisco might one day merge. Is there anything to that?**

There is a lot going on between Cisco and SynOptics, but

(continued on page 10)

## INDUSTRY BRIEFS

**IBM, Auspex focus on server futures.** Auspex Systems, Inc. and IBM’s Storage Products Line of Business last week said they have teamed to develop a prototype network file server that is based on an Auspex architecture and uses IBM’s new 3½-in., 1G-byte disk drive. The vendors said the effort is the first fruits of an agreement to explore development opportunities in the high-performance file-server market. IBM declined to say whether the prototype will be offered as commercially.

**WorldCom to market Marathon muxes.** World Communications, Inc. last week announced an agreement to resell Micom Communications Corp.’s Marathon data/voice multiplexers on a private label basis. WorldCom said it has agreed to sell \$750,000 worth of the Micom equipment.

**PacTel forms data services unit.** PacTel Corp. last week said it has formed PacTel Wireless Data as a division of its PacTel Cellular unit to develop and sell wireless data communications services over the PacTel cellular network. PacTel officials said the new unit plans to initiate wireless data network services later this year. □

## People & Positions

**Lannet Data Communications, Inc.**, a Huntington Beach, Calif., maker of smart wiring hubs, recently appointed **Michael Salzman** as vice-president of engineering.

Previously, Salzman was director of data applications for Network Equipment Technologies, Inc.

**Forrester Research, Inc.** last week announced that **Paul Callahan** has been named a senior analyst at the Cambridge, Mass., market research firm’s Network Strategy Service. He will be responsible for analyzing the local-area network, internetworking, net management and cell relay markets, among others.

Previously, Callahan was a product planner for Digital Equipment Corp.’s network business. Prior to that, he was a senior telecommunications engineer at Bank of New England Corp.

**Paul Cosgrave** last week was named president and

(continued on page 10)



## Group to support binary files on X.400

*continued from page 9*

meeting that they will need to register their PC-based application products with ANSI. This will ensure that each vendor's application will have a unique identification number that can be included in the Body Part 15 tag for easy reading and translation by any message translation software on an X.400 network, said Steven Farowich, chairman of EMA's PRMD Operators Committee. Another organization, possibly EMA itself, is expected to act as "a clearinghouse" that will make the listing of document software identification numbers easily accessible to vendors and users,

Farowich said.

Jonathan Kauffman, a program manager in Microsoft's Workgroup Application Group, applauded the effort.

"It's a win for everybody," Kauffman said. "It's a win for the mail vendors because they get a sensible standard way to mark [binary files] in their mail systems; applications vendors because they get an easy way to register their products; and for user organizations because they have a real problem with conversion [of binary files] right now."

The issue now will be getting document software vendors to register their products and E-mail system vendors to integrate the identification numbers into their wares, Kauffman said. ■

## SynOptics exec sheds light on vendor ties

*continued from page 9*

there isn't anything leading to a merger or acquisition. The two companies really have separate agendas from that point of view.

We've had successful OEM relationships with them on several router products. We have another product that is under development that [will come] to market this year, and that is an FDDI, Ethernet and token-ring router that will go in the [SynOptics] System 3000. That is an OEM deal, but the technology is more of a joint effort than the previous ones.

Cisco and SynOptics is another case of a

good working relationship. Proximity is important — the companies are located 10 minutes apart — and it is important that Cisco's [President and CEO] John Morgridge and I have a good personal relationship. We [both] know what the other guy is up to.

That led to the RubSystem product. The RubSystem is the next-generation wiring hub in that it will have totally integrated routing. We started from scratch six or seven months ago and will have a product in mid-1993.

### SynOptics resells Cisco routers. Does the company intend to build and market its own routers?

We have a reputation with our partners that we really like to use someone else's technology and integrate it into our architecture.

Our engineers are convinced that their plate is full. We've made it clear to them that they all are going to have jobs for the next two decades and they don't need to go out and reinvent things that are already out in the industry.

I think Cisco, at first, figured we'd come out with our own router 18 months after our OEM arrangement with them, but we didn't. We're sticking with theirs.

### What's your vision of where the internetworking market is going?

When I listen to the network architects at companies like Motorola [Inc.] and [The] Boeing [Co.], they say they'd love to have internetworking reduced down to the chip. They want network connectivity, flexibility and service to be in one place where they can get their arms around it. So our premise is that any functionality having to do with the lower layers of the ISO model is going to come together.

Given these customer requirements, I think it's fair to say that, over the next five years, there could be some major changes in the market players. Who knows, a company like Cisco could be a hub vendor five years from now. ■

## People & Positions

*continued from page 9*

chief executive officer of **AGS Computers, Inc.**, a systems integration subsidiary of Nynex Corp.

He succeeds **A.T. Engkvist**, who retired Dec. 31.

Cosgrave was previously managing partner of integration services and technology at Andersen Consulting.

**Synernetics, Inc.**, a Billerica, Mass., local-area network equipment vendor, last week announced that **David Tolwinski** has been named the company's vice-president of marketing.

Tolwinski had held the post of vice-president of marketing for Racal InterLan, Inc.

**Rolm Systems**, a business unit of Siemens Private Communication Systems, Inc., last week appointed **Karl Geng** as senior vice-president in the office of the president.

In this newly created position, Geng will oversee future product releases and assist Peter Pribilla, Rolm Systems president and chief executive officer, in managing day-to-day operations. Previously, Geng was president and CEO of Hell Graphic Systems. ■

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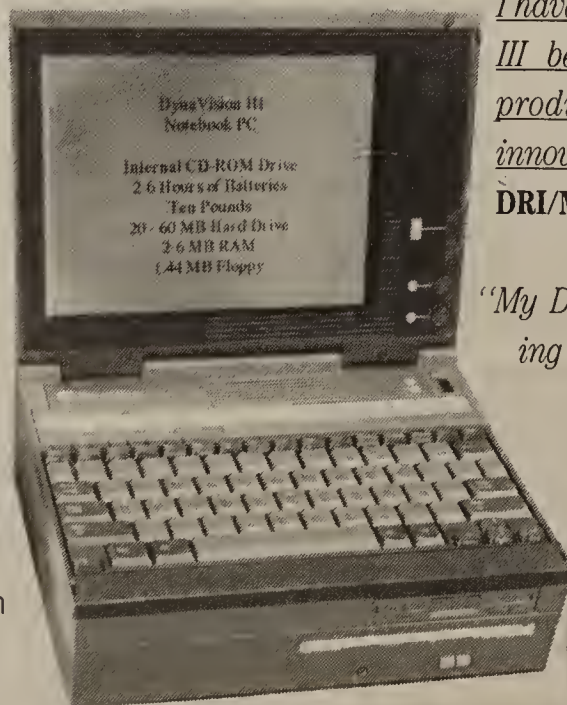
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# TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

## Worth Noting

**N**orthern Telecom, Inc. last week announced plans to offer models of its Meridian 1 digital private branch exchange equipped with Reduced Instruction Set Computer processors this spring but added that the new units will not be available until early next year.

## Virtual net providers mull cellular access questions

Carriers must try to provide for roaming callers.

By Daniel Briere  
Contributing Editor

AT&T last week began a quest to add cellular functionality to its Software-Defined Network (SDN) offering by announcing access to its virtual network service from cellular phones in Bell Atlantic Corp. and Nynex Corp. territories. Operating agreements with the two RBHCs will allow AT&T customers to subscribe lines to the 10732 SDN equal access code.

The announcement brings AT&T up to par with MCI Communications Corp. and US Sprint Communications Co., which have for years offered cellular access to their Vnet and Virtual Private Network services, respectively.

But all three carriers now face the same nettlesome questions concerning how to support callers that move about. "The issue is not just subscribing local lines to the virtual network," said Marlon Jahnke, senior manager of net services marketing for MCI. "It is dealing with what happens when the caller leaves his or her local calling area and wanders into another carrier's cellular region."

This roaming creates a problem for carriers because the cellular providers cannot use the embedded cellular telephone number to determine the customer's carrier preference.

"Today's cellular signaling

systems [cannot] query a centralized database and determine the caller's characteristics, as is done with other forms of virtual network functions," Jahnke said.

Migration of the local telephone companies and cellular providers to Signaling System 7 (SS7) technology will create for the first time the ability to inter-network between long-distance and local cellular carrier nets.

When the cellular call reaches the cellular provider's switch, an SS7 message could be sent to a centralized database to determine the caller's presubscribed carrier — in this case, a virtual network provider.

Lack of advanced signaling adds cost to cellular usage. For instance, if a New York subscriber was traveling in San Francisco for the day and someone in Los Angeles tried to reach him in New York, with today's advanced cellular systems, the caller would incur a Los Angeles-to-New York charge and the cellular subscriber would be charged a New York-to-San Francisco fee.

With the next generation of cellular signaling, long-distance network providers could query cellular providers' networks to find the subscriber and route the call directly. These advanced signaling links are expected to appear on the market later this year or in 1993. □

## Cost structure of AT&T's Tariff 12 Option 58

Figures based on minimum annual charges (in millions)

	1991	1992	1993	Total
Revenue	\$4.14	\$4.14	\$4.14	\$12.42
Annual costs	\$4.25	\$3.88	\$3.88	\$12.01
Cost breakdown				
Access	\$1.97	\$1.99	\$1.96	\$5.92
Operating	1.16	1.17	1.23	3.56
Depreciation	0.10	0.10	0.10	0.30
Other	1.02	0.62	0.59	2.23
Balance	-\$0.11	\$0.26	\$0.26	\$0.41

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: AT&T, NEW YORK

## AT&T asks to block Tariff 12 Option 58

Although the carrier claims that the option is not profitable, some question AT&T's real motives.

By Anita Taff  
Washington Bureau Chief

WASHINGTON, D.C. — AT&T this week is expected to learn whether the Federal Communications Commission will grant the carrier's emergency petition to discontinue sales of one of its Tariff 12 options.

AT&T filed an emergency application with the FCC late last month asking for permission to freeze new sales of Tariff 12's Option 58, a three-year deal originally designed for PepsiCo, Inc. AT&T said continued sales of the deal would cause it "severe financial harm."

If the FCC allows AT&T to discontinue Option 58, existing customers would be able to complete their contract term but probably not renew their deals.

AT&T's request is stirring controversy because the FCC specifically requires the carrier to make Tariff 12 deals available to all customers that want them. Some observers are already claiming that AT&T's request is just an effort to prevent resellers from purchasing Option 58, which offers attractive rates and terms.

Henry Levine, who counsels corporate customers, including resellers, on custom network deals, said he is certain that AT&T's emergency appeal is an effort to kill resale of Option 58.

He said the service mixture under Option 58, which includes 800 and other switched services, along with the option's terms has made it popular with resellers. At least eight resellers are currently purchasing the service and more want to place orders, he added.

"AT&T has consistently made efforts to defeat resale of Tariff 12," Levine said. "I view this ef-

fort as a new way to kill resale."

AT&T already failed to get the FCC to change Option 58 in order to imposed a whopping million-dollar installation charge on new customers. Previously, there was no such charge. Levine said that charge was designed to discourage resale, and when AT&T was unsuccessful in getting it implemented, the carrier used other methods to discourage resellers. "AT&T has been spurning Option 58 orders," he added.

AT&T strongly denies that its request to discontinue Option 58 is an attempt to shut out resellers.

The carrier said it was driven to ask for the freeze because the FCC decided to give Tariff 12 users the right to terminate their deals without penalty after 800 numbers become portable in 1993.

When AT&T originally negotiated PepsiCo's deal, the carrier said there were high start-up costs, and rather than raise prices for PepsiCo, AT&T agreed to carry the costs and not make any revenue the first year (see graphic, this page).

Besides showing a tremendous loss its first year, the filing also shows that AT&T expected to show a profit during the last two years of the deal and make an average total profit of between \$400,000 and \$500,000 for the three-year contract.

AT&T told the FCC in its emergency application that, because the agency issued new rules allowing customers to discontinue service without penalty when 800 numbers are scheduled to become portable, customers purchasing Option 58 now could discontinue the service before AT&T could make any profit. □

## WASHINGTON UPDATE

BY ANITA TAFF

**Regulators tow the line on rate hikes.** State regulators held the line against rate increases last year, according to a report compiled by the Federal Communications Commission. Local telephone companies asked for rate increases of \$385.6 million in 1991, but instead, regulators cut rates by \$84.6 million. The gap between rate increase requests and actual hikes was even wider in 1990. In that year, telephone companies requested \$1.1 billion in higher rates, but regulators ordered rate decreases of \$451.1 million.

One of the largest rate decreases last year occurred in California as a result of price cap regulation for intrastate services. Pacific Bell was ordered to cut rates by \$132 million in that filing. Other states ordering substantial rate cuts were Florida, Louisiana and Utah.

Utah regulators ordered US West Communications, Inc. to cut rates by \$28 million in two phases last year, while Florida regulators ordered Southern Bell Telephone and Telegraph Co. to cut rates by \$43 million as part of a new incentive regulation plan. Louisiana customers received a \$10.7 million cut in rates after regulators ordered \$20.2 million in cuts, which were balanced against a \$9.5 million increase in charges for inside wiring. □

## Carrier Watch

**US West Communications, Inc.** last week said that it will broaden its Self-Healing Network Service (SHNS) to protect T-1 traffic.

Similar to the carrier's original SHNS, which protected T-3 traffic, the T-1 enhancement provides a dedicated, customized net to back up T-1 lines at multiple locations in a local access and transport area during an outage.

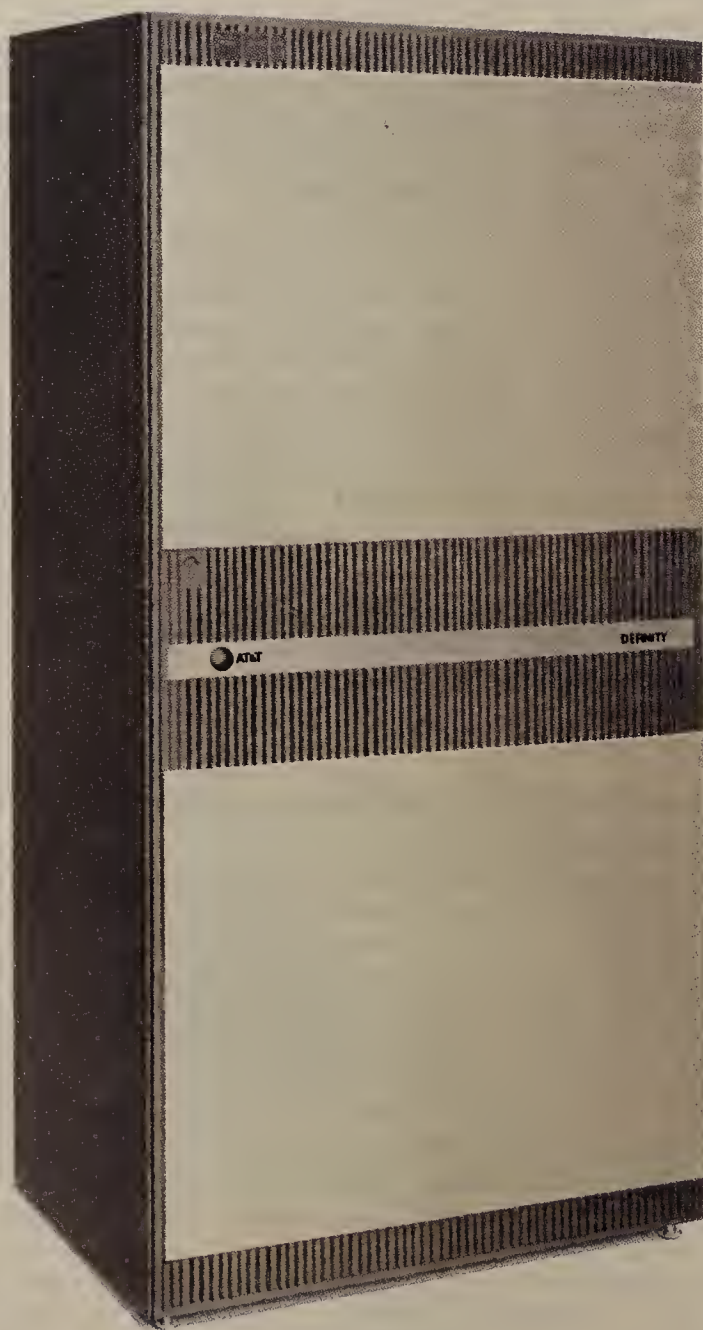
Introduced in 1990, SHNS provides backup transmission over two all-fiber concentric rings. When the service is performing normally, traffic is sent in one direction over a single ring. In the event of a system failure, SHNS nodes redirect the traffic flow and connectivity is maintained by reversing transmission in the protection ring. The switch to the protection path is made within 50 to 245 milliseconds.

"This is the product that will keep people talking and data flowing even after such a catastrophic incident as a cable cut," said Gerry Altermatt, a product manager at US West Communications.

According to company, Synchronous Optical Network equipment used with fiber enables it to extend SHNS to cover T-1 access links. "[With] the new technology, we can now offer T-1 customers a fiber-ring survivability product that meets the needs of a wide spectrum of our region's businesses," Altermatt said. □



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Let's face it, you'd rather be doing other things than checking on your system constantly. That's why the DEFINITY G3 System is loaded with self-diagnostic capability. Most of the time, it fixes itself before you know anything is wrong. And, as with all our digital systems, the DEFINITY G3 System will automatically call our Remote Maintenance and Testing Center in Denver whenever there's a system alarm and will work through the problem until it is resolved. You don't have to waste time babysitting your system.

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You asked for increased uptime. We're delivering the highest levels of duplication available. It's one of the reasons why the DEFINITY System is consistently rated as having the highest quality and reliability in the industry.

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V.120 and T-Link protocols	●	●	●	
D-channel X.25 PAD	●	●	●	
17-button keypad	●	●	●	
Supports voice and data	●			
Data only		●	●	
Supports up to five telephones	●			
Single terminal port	●		●	
2 to 4 terminal ports		●		
Software downline loadable			●	
Supports 2B1Q line encoding				●





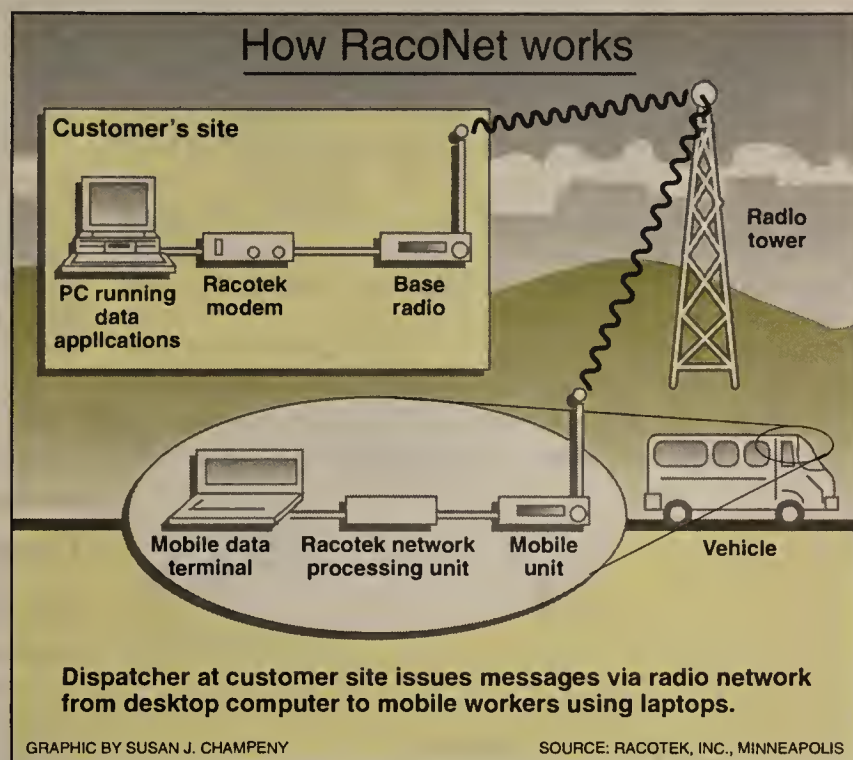
# DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

## Worth Noting

**"T**his is the year reality gets leaked back into the frame relay discussion."

**Daniel Warmenhoven**  
President and chief executive officer  
Network Equipment Technologies, Inc.  
Redwood City, Calif.



## Racotek, Motorola team to expand wireless services

Deal focuses on mobile data communications.

By Bob Brown  
Senior Editor

MINNEAPOLIS — Start-up Racotek, Inc. recently announced a joint development and marketing agreement with Motorola, Inc. that could greatly expand the availability of U.S. wireless mobile data communications services.

Under the agreement, users of Motorola's radios will be able to access the Racotek mobile data communications service in order

900-MHz frequency bands throughout about 1,100 U.S. cities. Racotek already has a similar agreement in place with E.F. Johnson Co., Motorola's largest competitor in the trunked radio market. Combined, those two companies control about 85% of that market.

Racotek — which began offering services in the fourth quarter of 1991 in a handful of locations, including Denver and Minneapolis — hopes to begin field trials in conjunction with Motorola by midyear.

"We're going after a large piece of the mobile data communications marketplace that hasn't been addressed by other providers," said Richard Cortese, Racotek's president and chief executive officer. "Large companies like Federal Express [Corp.] have their own systems, and other suppliers are targeting firms that need national coverage. But nobody else is addressing the needs of companies that have 50 or fewer vehicles."

Racotek's data service supports speeds up to 4.8K bit/sec, according to Cortese. While this is not close to real time, it will enable truck drivers and other field workers to communicate more closely with headquarters than they do now, he said.

As part of its network service, Racotek offers a variety of software and hardware products. The basic offering includes Racotek software that runs at the user's main dispatch site on a DOS- or Unix-based Intel Corp. 80386 computer linking a user's host applications with Racotek. Racotek also provides modems for the

(continued on page 16)

**"W**e're going after a larger piece of the market that hasn't been addressed."

▲▲▲

to tie field employees into corporate nets.

Racotek's agreement with Motorola is potentially significant for the start-up as well as the emerging mobile data communications market because it will enable Racotek to provide Racotek to the nation's largest installed base of trunked radio users.

Trunked radio is a technology that lets users share a group of radio channels — typically for two-way voice communications. As a Specialized Mobile Radio (SMR) operator, Motorola is the leading access provider to these radio channels.

Through the agreement with Motorola, Racotek's service will be available in the 800-MHz and

## Users mull inclusion in Brooklyn hot site

Wall Street crowd weighs economics of leasing space at fully networked back-up trading site.

By Jim Duffy  
Senior Editor

NEW YORK — Member banks and brokerage firms of the Wall Street Telecommunications Association (WSTA) are evaluating a proposal to lease space in a proposed disaster recovery facility for investment trading.

Collectively, the 14 investment firms that comprise the WSTA recently received a commitment from Metropolitan Fiber Systems, Inc. (MFS) and start-up Contingency Trading Facility, Inc. (CTF) to build and operate a hot site in Brooklyn, N.Y. ("Wall Street builds hot site," *NW*, Jan. 20).

But individually, the firms are still deciding if the expense of securing space at the facility is a worthwhile investment.

"We're evaluating the proposal [from CTF] at this point," said Allen Miller, vice-president of

global markets telecommunications at Banker's Trust Co. "It's a financial decision that has to be made."

Robert Healy, information systems manager at The Chase Manhattan Bank, N.A., added that "cost is a big factor."

MFS and CTF will build the facility only if the number of seats secured by investment firms can justify its construction cost, an MFS spokeswoman said.

"If there are not enough [commitments] to cost-justify the site, we may have to look at alternative arrangements," the spokeswoman said.

Contracts to secure occupancy in the facility run for three years. CTF will offer users three purchasing options: dedicated space, which guarantees occupancy; semidedicated, where two firms share a pool of seats; and non-

(continued on page 16)

## DEC delays router debut due to snags

By Jim Duffy  
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. recently said it has delayed shipment of its Network Integration Server (NIS) 500 and 600 multiprotocol routers by at least 60 days due to software snags.

DEC is having trouble configuring the software responsible for synchronizing the operation of the servers' internal routing modules, each of which has its own processor, a spokeswoman said.

DEC announced the NIS 500 and 600 last year at the INTEROP 91 Fall trade show ("DEC readies router, net mgmt. blitz," *NW*, Oct. 7, 1991) and had promised to ship the unit last month.

The NIS 500, which is priced at \$14,000, is a two-slot device that routes DEC's DECnet, Transmission Control Protocol/Internet Protocol, Open Systems Interconnection and X.25 packets. The NIS 600 is a seven-slot model that routes the same protocols as the NIS 500 and costs \$40,000.

Both devices support line

speeds ranging from 1.2K to 2.048M bit/sec.

Users took news of the delay in stride. "I'm not surprised," said Phil Demar, network analyst at Fermi National Accelerator Laboratory in Batavia, Ill. "I don't think 60 or 90 days seriously impacts [Fermi's plans]," he said. "I don't consider that to be a major discouragement."

Dave Peters, a computer scientist at the National Aeronautics and Space Administration's Goddard Space Flight Center in Maryland, said, "We understand that delays happen with regard to any new technology."

Analysts, however, said the slip might be somewhat embarrassing to DEC, given the rollout last week of IBM's long-anticipated 6611 Network Processor and DEC's reluctance until now to support some popular protocols, such as Apple Computer, Inc.'s AppleTalk, Novell, Inc.'s Inter-network Packet Exchange (IPX) and Xerox Corp.'s Xerox Network Systems.

"They're already behind on protocol support and presence in the market," said Chris Christensen of the META Group, a Westport, Conn., consultancy. "This might exacerbate existing problems."

The DEC spokeswoman said her company will ship updated versions of NIS 500 and 600 this fall. ■

## Data Packets

Data Race, Inc. last week unveiled a module that enables its statistical multiplexers to support 16K bit/sec voice and facsimile traffic over the same 56K/64K bit/sec digital link as data traffic. The module is intended to let users feed voice traffic from low-volume sites to a central location or onto a private backbone net, thus reducing telephone charges by keeping calls off the public network.

Data Race's new Free Speech Voice/Fax module enables the company's MACH DS line of statistical muxes to each support as many as three voice or fax channels per digital data service link. Users do not have to dedicate bandwidth to voice applications. Rather, the module dynamically allocates bandwidth to voice or fax applications as needed by throttling back data traffic. The Free Speech module plugs into another new Data Race module, the Digital Dual Link Card.

All the new modules are due this quarter. The Free Speech module costs \$995 per voice or fax channel, and the Digital Dual Link Card is priced at \$800. A data service unit/channel service unit module costs \$695.

Pacific Bell recently added an X.400 name-search directory feature, based on Digital Equipment Corp.'s Enterprise Messaging Server, to its public electronic messaging system.

The feature enables users of Pacific Bell Connection service and private messaging systems to locate X.400 ad-

(continued on page 16)



## Users mull inclusion in Brooklyn hot site

*continued from page 15*

dedicated, whereby four firms can share a pool of seats.

The dedicated option costs \$11,000 per seat per year. The semidedicated option costs \$6,000 per seat per year, and the nondedicated offer costs \$4,000 per seat per year.

The facility, which will take six months to build, will feature actual trading floors, allowing customers to continue trading operations within 24 hours of notification.

Based on predetermined customer profiles and updates of those profiles, facility managers can quickly reconfigure the hot site's computers, install data and cut over

telephone circuits.

"This will afford us the opportunity to maintain the requirements of trading and also the requirements to deal with the processing of the day's work," said Lou Scotto, managing director of Mabon Securities and chairman of the WSTA's hot site consortium.

MFS will finance, build and manage the facility, as well as provide telecommunications services over its fiber-optic loops in Midtown and Lower Manhattan and Brooklyn. A T-3 circuit will link the Manhattan and Brooklyn networks, according to Kathleen Perone, vice-president of sales

for MFS here.

New York Telephone Co.'s Securities Industry Association fiber loop will also be used. That net has T-1s between central offices and 64K bit/sec fiber circuits from user sites to the central office, Perone said.

The hot site will accommodate 250 trading seats. The facility will provide traders with voice and data lines to and from the stations as well as computer equipment. Each of the stations will be equipped with market data services from Quotron Systems, Inc., Reuters Holdings PLC and Telerate Systems, Inc.

Five trading rooms with 50 stations each will be equipped with a separate Novell, Inc. NetWare local-area network on Ethernet. The LANs will be linked via Eth-

ernet to a Digital Equipment Corp. MicroVAX 4000 communications server for sharing data between LANs.

A DECnet/Systems Network Architecture gateway on the MicroVAX server will access back office IBM and DEC systems so LAN users can download files from those systems.

To handle incoming and outgoing telephone lines, V Band Corp. will supply trading turrets to the hot site. V Band's ViAX DN digital turrets function much like private branch exchanges and will connect the trading desk directly to T-1 circuits on the MFS network, Perone said.

New York Telephone's Intellipath II Centrex service will provide voice service at the site. □

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## Companies team to expand services

*continued from page 15*

customer site and the mobile users, as well as laptop and hand-held computers for the mobile user.

Racotek's network offering is one of several emerging mobile data services on the market. Others include Advanced Radio Data Information Services (ARDIS), a nationwide network from IBM and Motorola, and the RAM Mobile Data Network, a RAM Mobile Data-BellSouth Corp. joint venture that offers service in major metropolitan areas and overlaps with Racotek.

Cortese said Racotek is seeking to differentiate itself from ARDIS and the RAM Mobile Data Network by offering its service in more locations and at a lower price by taking advantage of the existing SMR infrastructures.

Both ARDIS Co., the joint venture formed by IBM and Motorola to run the ARDIS net, and RAM Mobile are building their own networks, he added.

In a move related to the Motorola-Racotek agreement, Morton Topfer, Motorola's executive vice-president and chairman of ARDIS Co., has been elected to Racotek's board of directors.

Separately, Racotek last week announced the collection of \$12 million in its third round of venture capital funding. □

## Data Packets

*continued from page 15*

addresses of other users by typing in the user's name. The name-search directory is intended to serve as an interim solution for the X.500 directory standard.

NCR Corp. recently expanded its help desk services program by offering customers on-site training and tools for implementing their own internal network help desk. Previously, NCR personnel provided customers with help desk services from an NCR-staffed facility. That service will continue to be available.

NCR is providing three service options: Self-Instruct is a training manual for help desk implementation, responsibilities, staffing methods and problem management techniques; On-Site is a training manual and seminar offering problem resolution techniques; and Intern allows NCR staffers to work along with the customer in order to devise problem-solving techniques and provide hands-on training at an NCR service center. Each option is priced as a onetime fee ranging from \$115 to \$6,115. □



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ICC '92 Vice Chairman Frank Splitt of Northern Telecom opens Monday morning with international panelists Theodor Imer, Director of CCITT and Enrique Used Aznar, Chairman of Telefonica International. Discussion focuses on the changing world of international telecommunications and standards, exploring this year's overall theme: "Discovering a New World of Communications."

Tuesday morning, keynote speaker and Motorola Chairman George Fisher discusses "Learning to Compete in a Market-Driven Wireless World." As a driving force behind Motorola's success in wireless communications, Fisher will tell you what you need to know about wireless and how it will affect you.



Motorola Chairman George Fisher

The Wednesday morning Opening Session will highlight the role of telecommunications in education. Watch for more details in future brochures.

## Major Addresses At ICC '92 Luncheon On Monday And Banquet On Tuesday



On Monday the ICC '92 Awards Luncheon will feature William L. Weiss, Chairman and CEO of Ameritech, providing insight

on building an information society.  
ICC '92 fee applies.





The ICC Annual Banquet on Tuesday night will be addressed by George Heilmeier, the new President and CEO of Bell

Communications Research. Bellcore provides research and other technical support to the Bell Regional Holding Companies, Cincinnati Bell Telephone Co. and Southern New England Telephone Co.

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### International Panel by ICC '92

9:30 – 10:45 a.m.

- 101 Synchronous Optical Networks – An Update
- 102 Developing European Digital Cellular Market
- 103 Evolving Information Environment – User Needs

11:00 a.m. – 12:15 p.m.

- 104 Applications and Implementations of SONET
- 105 Report Card on Investments in International Telecommunications
- 106 User Benefits/New Public Network Architectures

2:00 – 3:15 p.m.

- 107 The Basics of CCS/SS7
- 108 Opportunities in the Asia/Pacific Telecommunications Market
- 109 User Management of New Public Network Services

3:30 – 4:45 p.m.

- 110 Harmonious Hybrids in the '90s
- 111 The Caribbean – Telecom Growth Market

3:30 – 5:15 p.m.

- 112 HDSL: COPPER Value Just Went Up!

8:00 – 9:00 a.m.

### Joint Plenary Session/Keynote Address

9:30 – 10:45 a.m.

- 113 Numbering Resources: Will We Run Out?
- 114 Where Will PCS & Cellular Meet in the Market?
- 115 Managing Growth in Evolving Public Network

11:00 a.m. – 12:15 p.m.

- 116 Exploring Transition to Competition
- 117 Information Services: Retail On-Line Transaction Processing

2:00 – 3:15 p.m.

- 119 Planning Considerations for CCS/SS7
- 120 Introduction to Fast-Packet Switching – Part I
- 121 New for '92: User Applications of ISDN

3:30 – 4:45 p.m.

- 122 Access Restructure – What's at Play for Small Companies?
- 123 Video Customer Premise Equipment
- 124 Introduction to Fast-Packet Switching – Part II

**Grouped in three technical levels, the following are offered by ICC '92:**

## 200 Level

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9:30 a.m. – 12:15 p.m.

- 201 ISDN Services
- 202 FTTH – Network Migration Strategies

2:00 – 3:15 p.m.

- 203 ISDN Update
- 204 Key Issues for FITL Systems

3:30 – 4:45 p.m.

- 205 Near-Term IN Services
- 206 Quality Issues in Network Operations and Management

9:30 – 10:45 a.m.

- 207 Network Update: The Digital Transition
- 208 Technology Management

11:00 a.m. – 12:15 p.m.

- 209 SONET – Impact on the Network
- 210 Radio Access

2:00 – 3:15 p.m.

- 211 New Network Applications
- 212 PCS Network Evolution

3:30 – 4:45 p.m.

- 213 Private Digital Radio Networks
- 214 Advances in DLC Systems

## 300 Level

ICC  
Sessions

9:00 a.m. – 12 noon

- 301 Performance Analysis of Data Protocols
- 302 Technology Issues of Wireless Communications
- 303 Voice Technology Advances – Public/Private
- 304 Combining Radio and Fiber
- 305 Signal Processing for Digital Storage Systems
- 306 Packet Switching
- 307 Self-Healing Networks and Integrated Network Management
- 308 Management of High-Speed LAN/WAN Nets
- 309 Personalized TV
- 310 CDMA for Personal & Mobile Communications

2:00 – 5:00 p.m.

- 311 ATM Switching and Broadband Networking
- 312 Digital Cellular and Microcellular Systems
- 313 Application of Signal Processing in Coding
- 314 Communications Satellite Technologies
- 315 Queueing Performance of Data Networks
- 316 Network Survivability Performance
- 317 Specification Technologies for Software
- 318 Quality Management for Customer Satisfaction
- 319 Radio Design Techniques and Algorithms for Personal Communications
- 320 Queueing Models for Data Communication Networks
- 320 Advances in Video and Image Processing

9:00 a.m. – 12 noon

- 321 Emerging IN: Transition & Implementation Issues
- 322 Impact of Multimedia Services on Protocols
- 323 Modulation and Coding I
- 324 Performance Enhancement in PCS Radio
- 325 Dimensioning/Control of ATM Networks I
- 326 High-Speed Transmission Technology
- 327 Global Information Architecture
- 328 Land Mobile Satellite Communication Techniques
- 329 Adaptive Filtering in Pulse Shaping & ISDN
- 330 Photonic Switching and Interconnects

2:00 – 5:00 p.m.

- 331 PCN Radio Systems Engineering
- 332 Progress in Broadband Switching Systems
- 333 Modulation and Coding II
- 334 High-Speed Protocols
- 335 Dimensioning/Control of ATM Networks II
- 335 Network Control and Service Management in ATM Networks
- 336 Issues in Wireless Communication Networks
- 337 Propagation Effects in Satellite Communications
- 337 Multimedia Communications for Cooperative Applications
- 338 High-Speed MANs
- 339 Customer Evaluations

## 400 Level

ICC  
Tutorials And  
Workshops\*

9:00 a.m. – 5:00 p.m.

- 401 Broadband Networking

9:00 a.m. – 12 noon

- 404 Telecommunications Management Network: Principles, Models and Applications

2:00 – 5:00 p.m.

- 405 Signalling System Number 7 for Fixed and Mobile Networks

12:15 – 1:45 p.m.

### Awards Luncheon

9:00 a.m. – 5:00 p.m.

- 402 Broadband Services and Industrial Applications

9:00 a.m. – 12:30 p.m.

- 407 Network Synchronization

2:00 – 5:00 p.m.

- 408 Technology Management: A Shifting Paradigm

6:00 p.m.

### Conference Banquet

\* For technically-oriented professionals seeking an overview. Register early – space is limited.



# Wednesday

9 a.m. - 5 p.m.

# Thursday

9 a.m. - 3 p.m.

8:00 - 9:15 a.m.

## General Session

9:30 - 10:45 a.m.

- 125 The Basics of IN/AIN
- 126 The Ameritech PCS Trial
- 127 Distance Learning: Minds Across Miles

11:00 a.m. - 12:15 p.m.

- 128 Accelerated Modernization of Infrastructure and Economic Benefits
- 129 Delivering Enhanced Services to the Customer
- 130 Looking Ahead: Fiber in the Loop - Part II

2:00 - 3:15 p.m.

- 131 800 Number Portability
- 132 National Network Billing Services
- 133 New International Services for Corporate Users

3:30 - 4:45 p.m.

- 134 Infrastructure Sharing - Services for Small Companies
- 135 Dial-up Videoconferencing/When a Reality?
- 3:30 - 5:15 p.m.
- 136 Auto. Message Accounting Modernization

9:30 - 10:45 a.m.

- 215 Broadband ATM/STM Network Opportunities

9:30 a.m. - 12:15 p.m.

- 216 Significant Telecom Technology Standards

11:00 a.m. - 12:15 p.m.

- 217 Broadband Nets & Systems Experiments/Trials

2:00 - 3:15 p.m.

- 218 Architectures for Enhanced Services Platforms
- 219 Expert Systems in Telecom's Real Experiences

3:30 - 4:45 p.m.

- 220 Capturing Cellular Data Markets
- 221 Mass Market Telecom Services

9:30 a.m. - 12:30 p.m.

- 340 Photonic Networks I
- 341 Congestion Control & Routing in High-Speed Networks
- 342 Wireless Local Area Networks
- 343 Neural Network Techniques: Adaptive Filtering
- 344 Analysis & Design: Communications Systems
- 345 Mobile Communication Networks

A

345 Packet Radio Networks

B

- 346 Coding for Digital Storage Systems
- 347 Advanced Technologies in Management of Transport Networks
- 348 Advances in Data Communications

2:00 - 5:00 p.m.

- 349 Photonic Networks II
- 350 Advanced Techniques for Terrestrial Digital Radio
- 351 Adaptive Equalization of Time Dispersive Channels
- 352 AI Applications in Telecommunications
- 353 Digital Signal Processing for Satellite and Space Communications
- 354 Advances in ATM Switching
- 355 Global Quest for Quality
- 356 PCSs and Their Implementation

9:30 a.m. - 5:00 p.m.

- 403 Tutorial #3 Spread Spectrum Systems: Techniques and Applications
- 406 Tutorial #4 Satellite ISDN: Architectures, Technology and Applications

8:00 - 9:15 a.m.

- 137 Q&A for Small Telcos on Implementing Equal Access

9:30 - 10:45 a.m.

- 138 Perspectives on Advanced Intelligent Network

- 139 Wireless Data Communications - Taking Users Into the Future

- 140 Competitive Alternatives to the Local Loop

11:00 a.m. - 12:15 p.m.

- 141 Where the Rubber Meets the Road: Successful National ISDN Deployment
- 142 A User's View of Voice Processing Today
- 143 Preventing Network Outages

Please Note: Schedule Subject to Change

## ICC Feature Sessions

(Free of Charge)

#318:

Quality Management for Customer Satisfaction

Monday, 2:00 - 5:00 p.m.

#327:

Global Information Architecture

Tuesday, 9:00 a.m. - 12 noon

## Gigabit Networking Workshop

Tuesday & Wednesday  
8:30 a.m. - 2:00 p.m.

(Fee Required)

For more info, see back cover.

## Help Us Help You

We want to make your comfort our priority. But we need your help. Please write in the SUPERCOMM '92 and ICC '92 session numbers or other events you plan to attend, so we can make the best use of the available meeting space. Return to Henry Wieland, Executive Director - Special Events, USTA, 900 19th Street, NW, Suite 800, Washington, D.C. USA 20006-2190. Fax: (202) 835-3248. Thank you!

## Locator/Hotel Map

- |                                       |                           |
|---------------------------------------|---------------------------|
| 1 The Bismark Hotel                   | 15 Hotel Intercontinental |
| 2 The Blackstone Hotel                | 16 Hotel Nikko            |
| 3 Chicago Hilton & Towers: ICC '92 HQ | 17 Inn of Chicago         |
| 4 The Congress Hotel                  | 18 The Knickerbocker      |
| 5 Days Inn                            | 19 The Lenox House        |
| 6 The Drake                           | 20 The Marriott           |
| 7 Embassy Suites                      | 21 McCormick Center       |
| 8 Essex Inn                           | 22 The Oxford House       |
| 9 Executive House                     | 23 Palmer House Hilton    |
| 10 Forum Hotel                        | 24 Ramada, Lake Shore     |
| 11 Grant Park Hotel                   | 25 The Richmond Hotel     |
| 12 Guest Quarters                     | 26 Sheraton Chicago       |
| 13 Holiday Inn City Centre            | 27 Sheraton Plaza         |
| 14 Holiday Inn Mart Plaza             | 28 Stouffer Riviere       |
|                                       | 29 The Tremont            |





## Housing and Registration Information

Rogal America is handling all housing arrangements. Its booth will be located in the Registration Area of McCormick Place. All housing questions should be directed to Rogal.

### Hotel Confirmations/Changes

Hotel reservation acknowledgements will be sent directly to you from Rogal. Any hotel changes or cancellations must be made directly through Rogal. Do not call the hotels directly. Hotel changes or cancellations can be made by mail, or fax 617/965-2729, Telex 413053 ROGALAM, or call 617/965-8000 or 1-800-553-0505.

### Hotel Deposits

A hotel deposit is required for each hotel room/suite requested. The deposit must be submitted with the Official Housing/Registration Form. Forms are date-stamped and processed on a first-come, first-serve basis. All rooms must have a deposit in the amount of one night's lodging. The deposit may be in the form of a major credit card or a check payable to "Rogal America, Inc." (The Oxford House accepts only a check or money order as deposit.)

### Registration Deadlines

The SUPERCOMM '92 deadline is May 15, 1992. After this date, registrations for SUPERCOMM will not be honored, and you will not receive your badge by mail. Please register on site. ICC '92 registration will be accepted until one week before the conference. Housing will be available on a space available basis.

### SUPERCOMM '92 Registration

For SUPERCOMM '92 only, fill in the registration and housing information and mail with hotel deposit. Badges will be mailed (USA and Canadian addresses only) to all SUPERCOMM attendees, so please provide the complete correct mailing address for each registrant. You will receive your badge approximately 2 weeks prior to the show. If you do not receive your badge, please register on site.

Foreign badges will not be mailed. Please pick up your badge at the McCormick Place registration booth.

### ICC '92 Registration

To register for ICC '92 sessions, please fill in the ICC '92 Registration Fees section in addition to the hous-

ing/registration information. Please include a check or payment for the ICC '92 sessions. Make checks payable to ICC '92. Important: If paying by check, separate checks for housing and registration fees must be sent. Payment in U.S. dollars only.

### Discount Airline And Car Rental Information

American Airlines is designated as the SUPERCOMM '92 and ICC '92 preferred airline. To book your reservations, please contact Himmel & Associates at 1-800-328-6898 and identify yourself as an attendee. Reduced airfares are offered on most airlines, so call early. If calling from overseas, (312) 236-6470; from Canada, 1-800-621-2386; or fax your travel request to (312) 236-0377.

Please support the SUPERCOMM and ICC programs by allowing Himmel & Associates to handle your travel arrangements. By doing so you will help our programs, and be eligible to win two free tickets in the continental U.S.

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Group #242434 - Rate Code G3

From Canada, 1-800-327-9633 or call  
(305) 522-0000 for reservations.

Mail forms to: Rogal America, Inc.  
SUPERCOMM® '92 and ICC '92  
313 Washington Street, Suite 300  
Newton Corner, MA 02158

	Hotel	units	single	double
1	The Bismarck Hotel 171 W. Randolph Street	150	\$ 75	\$ 86
2	The Blackstone Hotel Michigan Ave. at Balbo	200	\$ 99	\$109
3	<b>Chicago Hilton &amp; Towers</b> 720 S. Michigan Ave. <b>(ICC '92 Headquarters Hotel)</b>	1000	\$140 \$205	\$165 \$230
4	The Congress Hotel 520 S. Michigan Ave.	150	\$ 95	\$105
5	Days Inn 644 N. Lake Shore Drive	150	\$ 99	\$109
6	The Drake 140 E. Walton Place	150	\$175	\$210
7	Embassy Suites 600 N. State Street	100	\$155	\$155
8	Essex Inn 800 S. Michigan Avenue	200	\$ 92 \$106	\$102 \$112
9	Executive House 71 E. Wacker Drive	250	\$120	\$135
10	Forum Hotel 525 N. Michigan Ave.	300	\$153	\$168
11	Grant Park Hotel (Best Western) 1100 S. Michigan Ave.	150	\$ 80	
12	Guest Quarters 198 E. Delaware Place	150	\$160	\$185
13	Holiday Inn Chicago City Centre 300 E. Ohio Street	200	\$128	\$144
14	Holiday Inn Mart Plaza 350 N. Orleans Street	200	\$112	\$125

	Hotel	units	single	double
15	Hotel Intercontinental 505 N. Michigan Ave.	200	\$210	\$231
16	Hotel Nikko 320 N. Dearborn	200	\$185	\$200
17	Inn of Chicago 162 E. Ohio at Michigan Ave.	200	\$108	\$116
18	The Knickerbocker Walton Place at Michigan Ave.	100	\$155	\$177
19	The Lenox House 616 N. Rush Street	100	\$ 99	\$109
20	The Marriott 540 N. Michigan Ave.	800	\$161	\$181
21	McCormick Center Hotel Lake Shore at 23rd Street	500	\$109 \$159	\$129 \$179
22	The Oxford House 225 N. Wabash	100	\$ 85	\$ 95
23	Palmer House Hilton 17 E. Monroe Street	900	\$119	\$119
24	Ramada, Lake Shore 4900 S. Lake Shore Drive	150	\$ 79	\$ 89
25	The Richmond Hotel 162 E. Ontario Street	100	\$115	\$127
26	Sheraton Chicago 301 E. North Water Street	700	\$163 \$191	\$191 \$219
27	Sheraton Plaza 160 E. Huron	150	\$149	\$169
28	Stouffer Riviere One W. Wacker Dr.	285	\$170	\$170
29	The Tremont 100 E. Chestnut St.	50	\$149	\$159



# Advance Registration/Housing Form (Whether or not you use hotel accommodations, you need to fill out this form)

Last Name \_\_\_\_\_  
First Name \_\_\_\_\_  
Nickname for Badge \_\_\_\_\_  
Company Name \_\_\_\_\_  
Street Address \_\_\_\_\_  
Room #/MS/Suite \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Telephone \_\_\_\_\_  
Fax \_\_\_\_\_

Industry Affiliation \_\_\_\_\_ (Use number from #1 below)

Professional Responsibility \_\_\_\_\_ (Use letter from #2 below)

IEEE Membership Number \_\_\_\_\_

Is your company a member of ☐ USTA ☐ TIA

Name of Spouse/  
Guest for Badge \_\_\_\_\_  
First Last

Do you require housing? ☐ YES ☐ NO

## HOTEL PREFERENCE

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

Please check how your choice was made: ☐ Rate ☐ Location

All rooms must have a guarantee in the amount of one night's lodging. You may guarantee your room with a major credit card or a check payable to Rogal America, Inc. (The Oxford House accepts only a check or money order as deposit.)

Hotel Room Type Requested (Single or Double) \_\_\_\_\_

## 1. INDUSTRY AFFILIATION

Choose ONE category that best describes your Industry Affiliation. (Also enter on form above under your address.)

### Exchange Carriers/Subsidiaries

- 10 Bell Holding Companies
- 11 Bell Operating Companies
- 12 Independent Holding Companies
- 13 Independent Operating Companies
- 14 Foreign Telcos

### Non-Operating Telco Subsidiaries

- 15 Bell
- 16 Independent

### Other Carriers

- 17 Long Distance
- 18 International
- 19 Mobile/Cellular
- 20 CATV/Radio/TV

### Other Telecom Providers

- 21 Telecom Manufacturers
- 22 Dealers & Distributors
- 23 Contractors & Electrical Services
- 24 Consultants & Architects
- 25 Financial & Leasing Companies
- 26 Data Communications Equipment Manufacturers
- 27 Data Communications Services
- 28 Telecommunications Associations

### Telecom Users

- 29 Educational
- 30 Financial/Investment
- 31 Hospitals/Health Care

- 32 Hotel/Motel
- 33 Legal/Insurance/Real Estate
- 34 Publishing
- 37 Research & Development
- 38 Stadiums/Convention Centers
- 39 Trade (Wholesale/Retail)
- 40 Transportation/Pipelines
- 41 Utilities (Gas/Water/Electric)

### Government

- 42 Government/Regulatory
- 43 Military
- 44 Foreign

### Other

- 46 Press
- 50 Spouse/Child (non-industry)
- 51 Other

## 2. PROFESSIONAL RESPONSIBILITY

Choose ONE that best describes your professional responsibility. (Also enter on form above under your address.)

- A Corporate/Administration
- B Sales/Marketing/Customer Service
- C Human Resources
- D Engineering
- E Network Operations
- F Research & Development
- G Central Office
- H Transmission
- I Cable & Wire
- J Voice/Data Management
- K Mobile/Cellular Communications
- L Support Services
- M Fiber Optic Operations
- N Other

## METHOD OF PAYMENT (Registration and Hotel)

☐ Check (must use separate checks for ICC '92 registration and hotel deposit)

\$ \_\_\_\_\_ for ICC '92 Registration \$ \_\_\_\_\_ for Hotel Deposit

☐ VISA ☐ MasterCard ☐ American Express

\$ \_\_\_\_\_ for ICC '92 Registration \$ \_\_\_\_\_ for Hotel Deposit

Credit Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

## Registration For SUPERCOMM '92 Seminars And Exhibition Is FREE ☐

### Registration Fees For ICC '92

	Before May 25	After May 25	TOTAL	CODE
<b>IEEE, USTA, or TIA MEMBER REGISTRATION</b>				
1 Full - Includes all Sessions, Record, Exhibits, Awards Luncheon, Banquet	\$275	\$325	\$ _____	1
2 LIMITEO - Includes all Sessions, Exhibits, Record	190	230	_____	2
3 1-OAY - Includes all Sessions, Exhibits (Circle one: MON TUES WEO)	145	145	_____	3
4 LIFE MEMBER - Includes all Sessions, Exhibits	5	5	_____	4

### NON-MEMBER REGISTRATION

5 FULL - Includes all Sessions, Record, Exhibits, Awards Luncheon, Banquet	\$375	\$425	_____	5
6 LIMITEO - Includes all Sessions, Exhibits, Record	290	330	_____	6
7 1-OAY - Includes all Sessions, Exhibits (Circle one: MON TUES WED)	245	245	_____	7

### OTHER

8 SERIES 200 SESSIONS ONLY, Exhibits	\$ 70	\$ 90	\$ _____	8
9 STUOENT - Includes all Sessions, Exhibits	5	5	_____	9

### OPTIONS (In addition to items included in Registration Fee above)

D. VIDEOS (In addition to items included in registration fee above)					
A Tutorial # 1 – Broadband Networking (Monday all day)	\$135	\$155	\$ _____	A	
B Tutorial # 2 – Broadband Services and Industrial Applications (Tuesday all day)	135	155	_____	B	
C Tutorial # 3 – Spread Spectrum Systems (Wednesday all day)	135	155	_____	C	
O Tutorial # 4 – Satellite ISON (Wednesday all day)	135	155	_____	O	
E Tutorial # 5 – Telecommunications Management Networks (Monday morning)	60	70	_____	E	
F Tutorial # 6 – Signalling System #7 for Fixed & Mobile Networks (Monday afternoon)	60	70	_____	F	
G Workshop # 1 – Network Synchronization (Tuesday morning)	60	70	_____	G	
H Workshop # 2 – Technology Management (Tuesday afternoon)	60	70	_____	H	
I Gigabit Networking Workshop (Tuesday and Wednesday)	295	395	_____	I	
K Awards Luncheon (Monday)	QTY _____	35	40	_____	K
L Conference Banquet (Tuesday)	QTY _____	50	55	_____	L
M Addl. Conference Record	QTY _____	70	85	_____	M
N Shipping Conf. Record (To listed street address – U.S. only)	QTY _____	15	15	_____	N

### FEATURE SESSIONS

O Quality Management for Customer Satisfaction (Monday afternoon)	(free of charge)	O
P Global Information Architecture (Tuesday morning)	(free of charge)	P

### SOCIAL EVENTS

SOCIAL EVENTS				
Q Chicago Highlights/Oceanarium (Monday morning)	QTY _____	\$ 25	\$ 30	\$ _____
R Monday Night at the Museum	QTY _____	53	58	_____
S Highlights, Chicago's Gold Coast (Tuesday morning)	QTY _____	24	29	_____
T Cooking Demonstration (Tuesday afternoon)	QTY _____	(free of charge)		
U Art Institute/Shopping (Wednesday morning)	QTY _____	23	28	_____

### TOTAL REMITTANCE

\$ \_\_\_\_\_

Must be in U.S. Dollars (No refunds for cancellations after May 25, 1992)

NW





**Telecom/MIS Managers:** Don't miss *Network World's* four SUPERCOMM seminars on new public network architectures and services, ISDN applications and new international services for end users. Also, half a dozen other seminars ranging from user needs and concerns, private/public network management, and information services to video services, wireless data communications, and network reliability. All seminars feature panel format, Q&A and *no charge to attend*.

### **Attend Gigabit Networking Workshop For Private Network Administrators**

The applications, architectures, and business impacts of ultra high-speed digital networking will be thoroughly examined in a special, informal and in-depth workshop on June 16-17 especially developed for senior-level managers/administrators of private networks.

Co-sponsored by IEEE's Communications Society, USTA, and TIA, the 8:30 am – 2 pm technical program features a theme speaker, two panel discussions, and a luncheon speaker each day. Subject matter ranges from network applications, architectures, and experiences to economics and benefits.

Free access to the SUPERCOMM '92 exhibition by 450 manufacturers and suppliers – including many demonstrating applications of broadband solutions available today – is included in the \$295 registration fee (\$395 after May 25). Free access to SUPERCOMM seminars and to high-speed networking and other key sessions at the co-located ICC '92 is also included.

Pre-register using the form on the previous page of this brochure – line 1. Or call (312)782-8597 for additional information. Seating will be limited for this in-depth private networking workshop, so please act promptly.

### **A Special Thanks!**

... to *Telephony Magazine* and *Network World* – official publishers for SUPERCOMM®'92 and ICC '92. Watch for important information-packed brochures inserted in the March 2 and April 6 issues.

**Telephony**



### **Need More Information?**

For Non-Technical Programming:



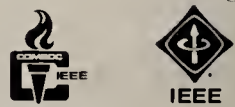
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Suite 800  
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International Data Corporation Announces

# Directions '92

One thing is certain in this constantly changing, dynamic world of information technology. You need to be well informed if you expect to remain competitive in the 1990's.

As the economy cools off and the competition heats up, it's imperative that you devise a strategic business plan that will position your company for success in the years ahead. It's even more imperative that this plan be based on the most reliable, insightful and conclusive market data available today.

For the past 27 years, International Data Corporation, the world's leading research firm on information technology, has been delivering strategic guidance to leading players in the IT industry through its highly respected Computer Industry Briefing Sessions.

Directions '92, to be held in March, will be IDC's biggest and most authoritative forum ever. In one information-packed day, you'll hear from the industry's top analysts as they evaluate the state of the industry today and probe into the issues and trends of tomorrow.

So register early and be assured of a seat at the forefront of the information technology industry.

## Directions '92 Highlights

### Welcome and Introduction

Kirk Campbell, President, CEO  
International Data Corporation

### The Multidimensional Buying Process

Patrick J. McGovern, Chairman  
International Data Group

### 1992 IT Spending Outlook

Kim Myhre, Senior V.P.  
Worldwide Consulting

### Client/Server: Direction of the '90s

Aaron Goldberg, Senior V.P.  
Desktop Computing Research

### The Structure of the IT Industry in the Year 2000

David Moschella, Senior V.P.  
Worldwide Research

### Systems Integration and Outsourcing

Rebecca Segal, V.P. Sales and Services  
Research

### Workstation Opportunities

Vicki J. Brown, V.P.  
Systems Research

### The Midrange Market Squeeze

David Vellante, V.P. Systems and  
Software Research



INTERNATIONAL DATA CORPORATION

5 Speen Street, Framingham, MA 01701

To register and for information, call:

Thursday, March 5, 1992

San Jose, CA

The Fairmont Hotel

(408) 998-1900

**1-800-343-4952**

Thursday, March 12, 1992

Boston, MA

Marriott at Copley Place

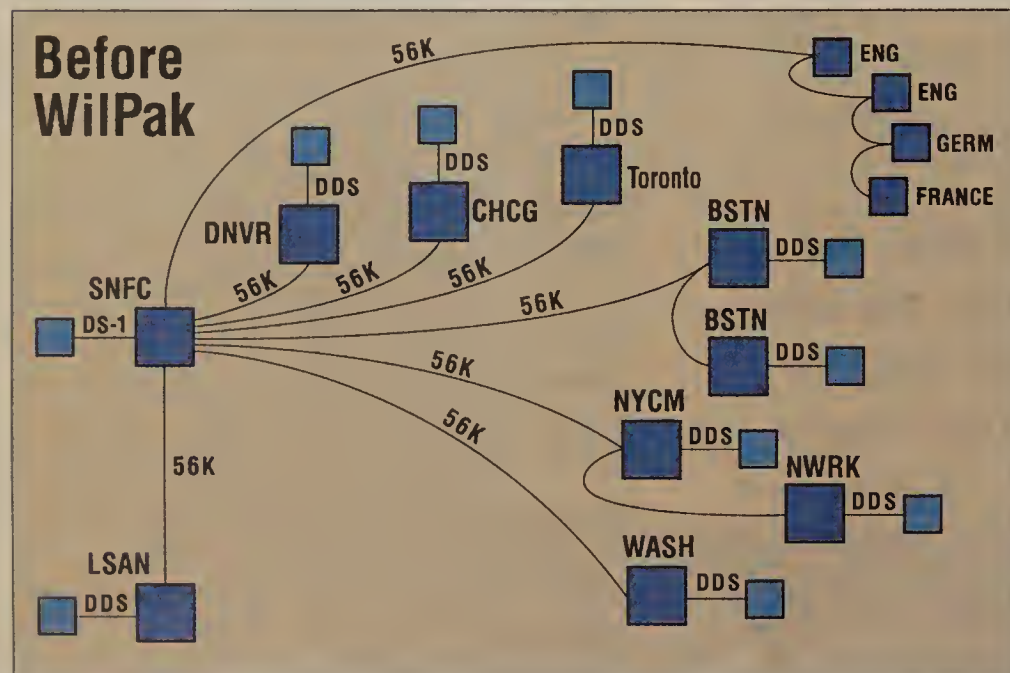
(617) 236-5800



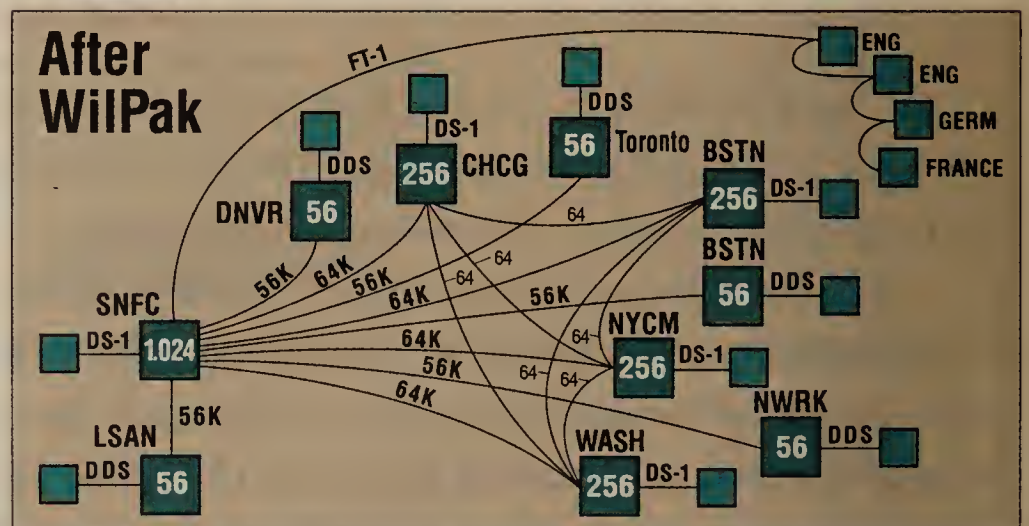
# How WilPak<sup>TM</sup> can cut costs in 5 weeks without scrapping your 5-year plan.

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TURNS UP TECHNOLOGY







## ACC introduces LAN, WAN bridge/router

*continued from page 19*

128K bytes or larger are used, according to a company spokesperson.

Protocols supported by each of the routing modules include TCP/IP, Digital Equipment Corp.'s DECnet, Xerox Corp.'s Xerox Network System, Novell, Inc.'s Internetwork Packet Exchange (IPX), Apple Computer, Inc.'s AppleTalk.

It will also support both source route and transparent bridging as well as the Open Shortest Path First routing protocol.

The ACCes/4500 is equipped with a dual-bus structure. As announced, the 10M bit/sec Ethernet A bus will support the

company's existing non-RISC-based bridge/router modules. The 320M bit/sec B bus, which has an aggregate bandwidth of 300K packet/sec, will support RISC-based interface cards. Those cards are expected to be announced this summer.

### The CPU role

Each of the RISC-based modules will have dual CPUs based on the Intel Corp. 960CA processor. One CPU will switch data and manage congestion across the B bus, while the other will serve as the communications processor engine for internetworking functions such as bridging and routing.

Since no CPU is used to switch data between the modules, each module can act as

a distributed processor and fully use the 320M bit/sec bus bandwidth.

### Ideal for multiple sites

According to Todd Dagres, director of communications research and consulting at The Yankee Group in Boston, the ACCes/4500, by acting as a central internetwork switching node, is ideal for applications where multiple local and remote sites need access to centrally located computer resources.

The ACCes/4500, which is compatible with the company's existing 4000 series of bridge/routers, is available 30 days after receipt of order. Pricing will range from \$14,995 to \$38,995, depending on configuration. ■

## Protocol analyzer gets test program

*continued from page 19*

get through the router.

The DA-30 Internetworking Analyzer supports dual simultaneous analysis of the local- and wide-area network interfaces on a bridge or router.

The interfaces currently available include Ethernet, token ring, X.21, V.24, V.35, V.36 and T-1.

The dual-analysis architecture incorporates a seven-slot backplane, including a motherboard containing a personal computer-compatible 386 processor.

One or two protocol analyzer modules, each with a 32-bit Reduced Instruction Set Computer processor, and as many as four line interfaces can be plugged in to the backplane. Any two of the line interfaces can be connected to a protocol analyzer module via software switching.

For example, to run an Ethernet bridge/router test, the DA-30 would be configured with two protocol analyzer modules and two Ethernet modules. The interfaces connect directly to the Ethernet ports on the bridge or router being tested.

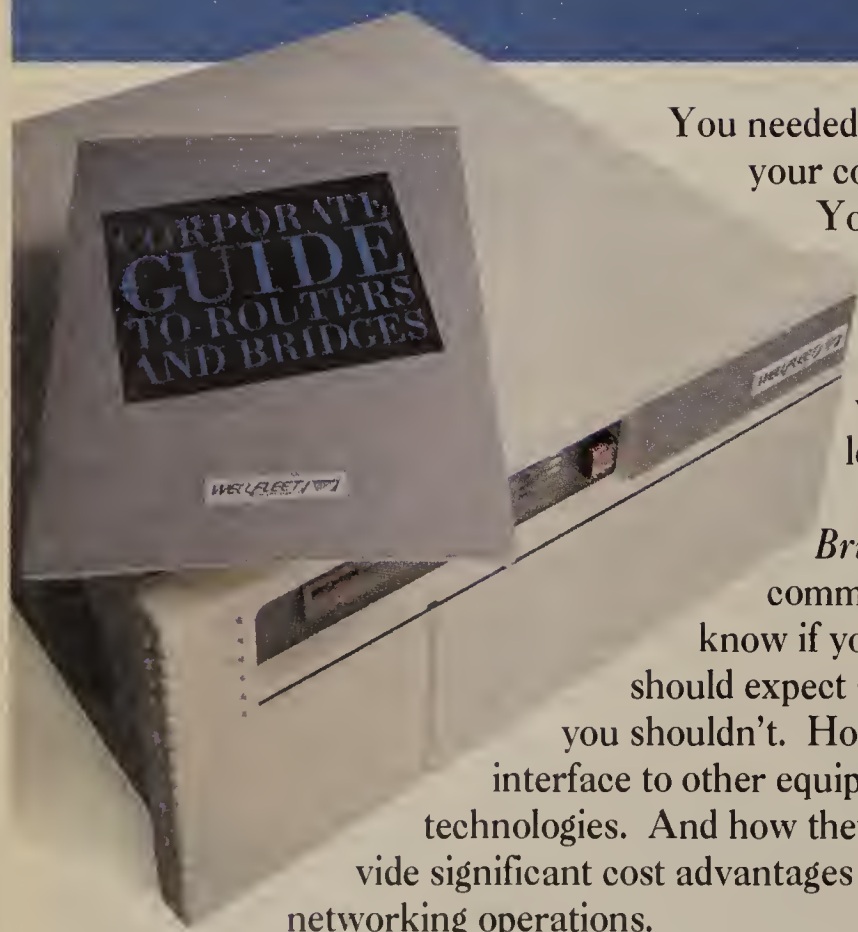
To perform measurements, one analyzer module in the DA-30 backplane sends frames through an Ethernet interface to the device being tested.

As the frames are forwarded, a second Ethernet interface, working with a second analyzer module, monitors the output of the router.

The application supports the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s Internetwork Packet Exchange (IPX) and Apple Computer, Inc.'s AppleTalk.

The application costs \$400 and will be available this month. ■

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## Intel, Novell unveil HMI-compliant hubs

*continued from page 19*

EtherExpress with, at no charge, Novell's HUBCON, a server-based network management software utility that lets users control and manage the new hubs either locally or remotely via Novell's NetWare Remote Management Facility.

Without the software, Novell's HUBCON would have to be purchased as part of Novell's new NetWare Hub Services software product, which adds network management capabilities as well as some Simple Network Management Protocol hub management facilities.

The EtherExpress ISA Hub Adapter, which costs \$749, will be available this month. The EISA version costs \$849 and is expected to ship in April. The harmonica RJ-45 adapter costs \$65, while the optional AUI connection kit costs \$25. The Expansion Hub Board is priced at \$649.

NetWare Hub Services Software costs \$250 and will be available next month from Novell, but not from Intel.

### Price reductions

In a related announcement, Intel announced price reductions and some new drivers, resulting in performance enhancements for its family of network interface cards.

Intel is reducing the price of its 16-bit EtherExpress LAN adapters by as much as 20%, with the new price set at \$179 for a single unit and \$849 for five units. ■



# MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

## Worth Noting

“Some companies don’t allow peer-to-peer communications between remote sites, and many don’t allow intercompany communications because they don’t know how to safeguard their networks from intrusions.”

Mary Johnston-Turner  
Principal  
Northeast Consulting  
Resources, Inc.  
Boston

## Developers of public E-mail directory issue guidelines

Establishes User Bill of Rights for privacy, security.

By Wayne Eckerson  
Senior Editor

TAMPA, Fla. — The North American Directory Forum (NADF), a consortium of 17 electronic mail carriers, last week issued privacy and security guidelines for a public E-mail directory service the group is developing.

The User Bill of Rights extends seven guarantees to users of the proposed directory service, including the right not to be listed in a public directory and to correct and remove information from the directory (see graphic, this page).

NADF members, meeting here, also hammered out additional details for interconnecting their E-mail directories to enable users of one service to find and message users of other services. The group is scheduled to begin a pilot test of a universal directory service later this quarter.

Defining users’ rights to privacy and security is a critical step in ensuring the success of a public directory service, said Gary Rowe, core services director at AT&T EasyLink Services and chairman of the NADF’s security and privacy subcommittee.

Many users have expressed concern that their E-mail listings would get into the hands of telemarketers or recruiters, who would flood employees with junk E-mail or job offers. They have also feared that rival companies might be able to use information contained in the listings for a competitive advantage.

“We wanted users to know up front what they can and cannot expect from the directory in terms of privacy and security protection,” Rowe said.

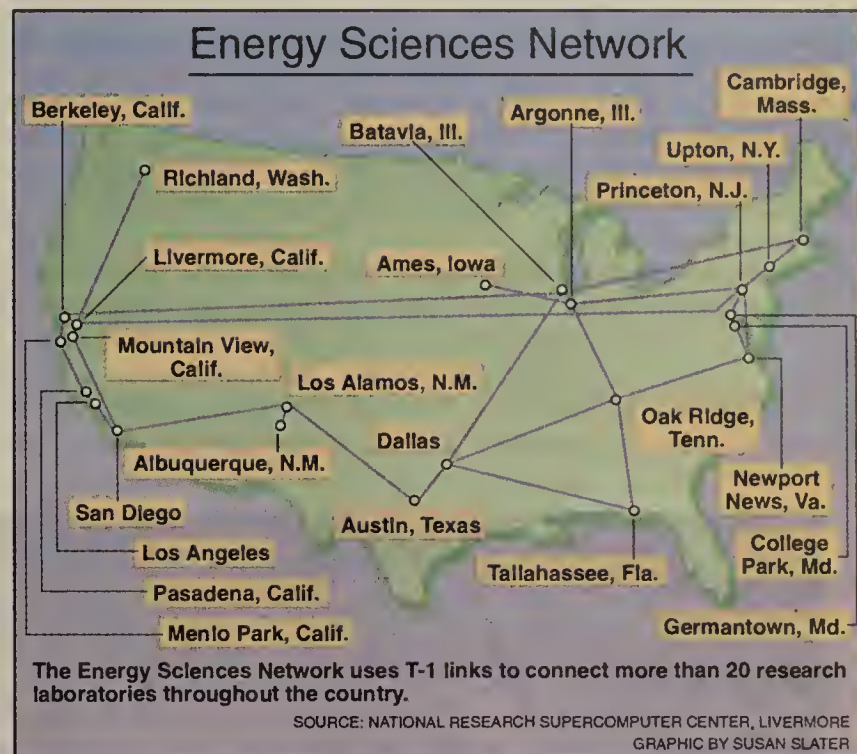
Users contacted by *Network World* said they approved of the User Bill of Rights and that NADF made a wise choice in issuing the guarantees before establishing a working directory service.

“It’s an excellent start,” said Brian Carey, director of technical support for the American Bar Association in Chicago. But NADF has to make sure that the rights are upheld and expanded as the directory grows in size and scope.

Initially, NADF members plan to interconnect their existing E-mail directories, which typically contain basic information such as names and E-mail addresses that users need to message others. Some carriers, such as AT&T EasyLink Services, carry additional information, including telephone and facsimile numbers, and postal address.

According to Janet Brehm, senior market planner for messaging at IBM’s Information Network here, NADF members said their directory may eventually provide more extensive information, such as addresses for electronic data interchange mailboxes and other applications, as well as phone numbers and street addresses for individuals and companies listed in directories kept by regional Bell holding companies.

(continued on page 22)



## Agency to overhaul Energy Sciences net

Will migrate the T-1 backbone to 622M bit/sec, upgrade the net to make it fully GOSIP compliant.

By Wayne Eckerson  
Senior Editor

LIVERMORE, Calif. — The Department of Energy is sparing no time or cost in preparing its national research network for the challenges of the 21st century.

By 1995, the Energy Department’s Energy Sciences Network (ESnet), a T-1 net connecting 25 research laboratories throughout the U.S., will support transmission speeds of 622M bit/sec and be fully compliant with the Government Open Systems Interconnection Profile (GOSIP).

The plan is being fueled in part by the recent passage of the High Performance Computing and Communications Act, which allocates \$400 million over five years to build a high-speed national research and education network.

As one of the beneficiaries of the legislation, the Energy Department will spend tens of millions of dollars to boost bandwidth on ESnet using cell relay technology, according to Jim Leighton, network manager at the National Energy Research Supercomputer Center (NERSC) here, which operates ESnet.

Leighton said NERSC will issue a request for proposal within the next month to carriers interested in providing high-speed services for the net. NERSC will help fund and test the service, he added.

By the end of this year, the chosen carrier will supply 45M bit/sec cell relay-based service between six ESnet sites, Leighton said. The link speed will be increased to 155M bit/sec by 1993 and 622M bit/sec by 1996, and

NERSC will gradually replace the ESnet T-1 backbone as the cell relay service becomes functional.

While laying the infrastructure for a high-speed network, NERSC is educating the various ESnet agencies about the service in order to spur development of applications to ride over the net, he explained. Agencies have already expressed interest in using the network for videoconferencing and remote monitoring of nuclear fusion reactors.

“We are trying to develop the network infrastructure and potential applications simultaneously so there’s no gap between what users want and what we can provide,” Leighton said.

Besides increasing transmission speed, the Energy Department intends to make ESnet fully GOSIP-compliant. An Energy Department mandate issued in 1990 requires that by 1995, all of its offices and Energy Department-funded research institutions must use GOSIP when transmitting information to each other.

As part of that effort, Energy Department-funded labs are looking to ESnet for guidance and support in implementing X.400 and X.500 service. Currently, most of the traffic on ESnet is supported using the Transmission Control Protocol/Internet Protocol, although ESnet also supports X.25 and Digital Equipment Corp.’s DECnet.

Next month, NERSC will publish two white papers — one on the deployment of X.400 and X.500 services and the other on (continued on page 22)

## EXECUTIVE BRIEFS

BY WAYNE ECKERSON

**Security breaches prevalent.** Corporate information security managers are ill-equipped to monitor and detect unauthorized network activity or security breaches, according to a survey of 119 information security managers conducted by DEMAX Software, Inc. and independent consultant Ray Kaplan.

Less than half the respondents said they could identify suspicious network activity or trace a live network connection back to its origins. Also, 29% of the respondents said they had experienced a security incident during the past year, while an additional 20% said they are not sure whether security breaches had occurred.

The survey showed that 59% of all incidents originated within a firm and 41% were caused by external factors. Almost half of the reported occurrences (41%) were caused by user errors or accidents. Viruses, worms and Trojan horses accounted for 21% of security incidents, and external hackers caused 16% of the incidents. Other instances were caused by employee revenge or dishonesty (12%) and natural disasters (6%).

## Association Watch

The **International Communications Association (ICA)** will hold its 45th Annual Conference and Exposition May 17-21 at the Georgia World Congress Center in Atlanta. The show will feature a Switched Multimegabit Data Service (SMDS) showcase that includes a dozen demonstrations of the new high-speed data service by vendors such as Digital Equipment Corp., Hewlett-Packard Co. and Sun Microsystems, Inc.

Vendors will demonstrate SMDS capabilities using a variety of applications, including multimedia, imaging, video and electronic publishing.

Keynote speakers include John Clendenin, chairman of the board and chief executive officer of BellSouth Corp.; Raymond Noorda, CEO, president and chairman of the board at Novell, Inc.; and Theodore Irmer, director of the Consultative Committee on International Telephony and Telegraphy.

The show will offer over 60 sessions for ICA members and nonmembers. The price for the full program is \$795 for ICA members and \$985 for nonmembers. One- and two-day passes are available.

To register for the show, call (214) 233-3889.



## Agency to overhaul Energy Sciences net

*continued from page 21*

Open Systems Interconnection routing — that will help Energy Department-funded labs implement interoperable OSI services. A handful of ESnet sites have already installed X.400 gateways to internal electronic mail networks, and some have implemented X.500 directory databases for name and address lookups.

To interconnect ESnet sites via X.400, ESnet uses two message transfer agents, which support X.400 running over TCP/IP and have recently been upgraded to support X.400 over a full OSI stack. This will allow ESnet sites to implement X.400 soft-

ware that runs over TCP/IP, a full OSI stack or both, said Tony Genovese, a computer scientist at NERSC.

According to Cathy Wittbrodt, a computer scientist at NERSC, to uphold X.400 messaging over a full OSI stack, ESnet uses Cisco Systems, Inc. multiprotocol routers that support OSI's network-layer connectionless network protocol (CLNP).

ESnet supports X.500 directory service agents, or databases, and the Energy Department plans to bring up another later this month. These databases will contain names and addresses of Energy Department researchers whose labs have not yet implemented an X.500 directory of their own. Eventually, each ESnet site will manage and support its own X.500 database,

Genovese said.

Currently, the volume of X.400 messaging and X.500 queries is quite low, according to Arlene Getchell, an NERSC computer scientist. That is in part because X.400 is a new service and vendor implementations of it don't offer more functionality than TCP/IP, giving users little impetus to change. Also, there is a lack of OSI troubleshooting tools, which makes it difficult to manage OSI networks.

But Getchell said that will change as ESnet sites gear up to comply with the Energy Department's GOSIP guidelines and vendors develop robust implementations of X.400 and better troubleshooting tools. She added that X.500 queries will increase as more sites establish X.500 directory

service agents and register more users.

"The more people we get into the X.500 database, the more it will be used," Getchell said. ■



NERSC employees involved with ESnet include (from l. to r.) Allen Sturtevant, Tony Genovese, Cathy Wittbrodt and Arlene Getchell.

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## Directory developers issue guidelines

*continued from page 21*

Most E-mail carriers already extend to customers many of the guarantees contained in the User Bill of Rights, she added.

NADF members hope that most users will agree to be listed in the public directory. "The directory will only be as good as the information in it," Brehm said. "We want all customers to have a public listing, even if it is just for the company and not individual employees."

NADF is exploring technical means to protect users' privacy while still maintaining a listing on the directory. She said this year's X.500 standard will specify security

### User Bill of Rights

#### NADF specifies privacy guarantees for X.500

- I. The right not to be listed.
- II. The right to have you or your agent informed when your entry is created.
- III. The right to examine your entry.
- IV. The right to correct inaccurate information in your entry.
- V. The right to remove specific information from your entry.
- VI. The right to be assured that your listing in the public directory will comply with U.S. or Canadian laws regulating privacy or access to the information.
- VII. The right to expect timely fulfillment of these rights.

SOURCE: NORTH AMERICAN DIRECTORY FORUM  
GRAPHIC BY SUSAN SLATER

and access control measures that will enable companies, for example, to identify the individuals who are authorized to read their directory listings.

The standards may also enable companies to partition their directory listings into public and private segments containing different information levels.

Since products based on this year's standards will not be available for some time, Brehm said NADF is trying to implement technology that will duplicate the security features specified in those standards. ■



# GLOBAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

## Worth Noting

**C**allers in the U.S. spent more time on international calls to Canada in 1990 than to any other country. The second most calls were made to the U.K., followed by Mexico, Germany, Japan, France and Italy, according to the International Institute of Communications in London.

## World News

**Sears Communications Co. (SCC)** last week disclosed pricing for its new international Systems Network Architecture transport service.

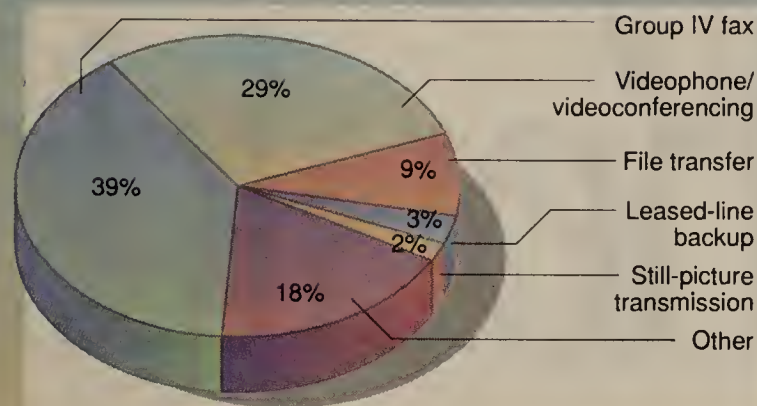
SCC, based in Schaumburg, Ill., introduced international SNA transport service in December by teaming with Philips Communications and Processing Services, a unit of the Dutch electronics firm, Philips, NV. The two companies linked their respective SNA nets to provide a global SNA service available from nodes throughout the U.S. and in 29 other countries ("Sears, Philips units offer global SNA network service," *NW*, Dec. 16).

Gene Chevalier, SCC's sales director, said Phillips and SCC will pass on local carrier charges to the subscriber with a 15% surcharge.

Usage charges are 9 cents per kilobyte for service from abroad to the U.S. Users can also send unlimited data volumes over dedicated 9.6K bit/sec access lines for \$2,800 per month per site. Users can send unlimited data volumes over 14.4K bit/sec access lines for \$3,600 per month per site.

Chevalier said that users can cost-justify the flat-rate charges for the 9.6K and 14.4K bit/sec access lines if they transmit more than 17,800 and 26,700 kilobytes, respectively, per month per site. ■

## Major applications of international ISDN in Japan



Figures are based on the percentage of 390 international ISDN circuits used for each application.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INFOCOM RESEARCH, INC., TOKYO, AND KOKUSAI DENSHIN DENWA COMPANY, LTD., TOKYO

## Hospital relies on int'l net to feed images to doctors

Net setup bridges Philippines to U.S. specialists.

By Alma Buelva  
IDG International News Service

MANILA, Philippines — The Makati Medical Center (MMC) has become the first hospital to use a personal computer-based imaging system to conduct international medical conferences over dial-up telephone lines.

The imaging system, modeled on PC-based software from Optel Communications, Inc. in New York, enables doctors here to send and receive medical rec-

ords that has attempted to connect [this imaging system] across the Pacific," Prasad said.

The Optel software runs on Intel Corp. 80386SX-based PCs here and at Stanford. They come equipped with 2M bytes of random-access memory and a 40M-byte hard disk. Images are then scanned into the PC using external scanners and are displayed on one of two video graphics adapter (VGA) color monitors linked to each PC used in the conference. The other VGA monitor displays medical records.

The Optel software enables users to move images, zoom in on and enlarge portions of an image, and use an arrow to point at a portion of an image. A separate dial-up voice line enables the doctors to discuss the images as they view them.

To conserve disk space and improve transmission time, images are compressed by software and a compression board in the PCs.

A major feature of the setup is that it enables doctors here and at Stanford to manipulate images simultaneously and view what the other party is doing.

"If doctors here scribble something, doctors at Stanford will see it as it is being written," Prasad said. "When they pan or zoom [in on] the image here, the same thing happens in the U.S."

The Optel medical teleconferencing system is also being used at the Harvard Medical School in Cambridge, Mass., and Washington University in St. Louis. The entire system is available in the U.S. for about \$15,000, Prasad said. Stanford has loaned MMC the medical teleconferencing system free of charge. ■

ords, X-rays, magnetic resonance images and other data to and from doctors at the Stanford University Medical Center in Stanford, Calif.

The setup enables doctors in both locations to view and manipulate images simultaneously and discuss the material over dial-up phone lines, said Purna Prasad, a clinical engineer at Stanford.

Prasad, who was in the Philippines last month to install the system, said the two hospitals are transmitting images to each other via modems running at 19.2K bit/sec. He noted that image quality is clear enough for doctors at Stanford to provide second opinions on diagnoses made by MMC doctors.

"Stanford is the first universi-

## Infonet intros global frame relay service

Service to have best coverage of current offerings; carrier sees service suited for int'l LAN traffic.

By Barton Crockett  
Senior Editor

EL SEGUNDO, Calif. — Infonet Services Corp. last week detailed plans to introduce international frame relay service in 11 countries this October.

The company's Infolan-Frame Relay service will have a broader international reach at its introduction than any other frame relay service, analysts said.

Although service providers such as AT&T, Cable & Wireless PLC, CompuServe, Inc. and US Sprint Communications Co. plan to offer international frame relay services, none will offer frame relay service to as many countries as Infonet will this year.

Infonet officials claimed that Infolan-Frame Relay is well positioned to support the coming explosion of international local-area net internetworking.

"We believe the market [for LAN internetworking] internationally will take off in the first half of '93," said Jean-Noel Moneton, Infonet's vice-president of communications services. "We feel confident that [Infolan-Frame Relay] is right on time for that market."

Infonet had previously announced plans to offer international, public frame relay service

Analysts said Infonet will be the first service provider to support a public frame relay service with IDNXs.

The Infolan-Frame Relay service will be offered at speeds ranging from 56K bit/sec to T-1 in the U.S. and from 64K bit/sec to E-1 in Europe, Moneton said.

Users will access the Infolan-

**I**nfonet will be the first service provider to support a public frame relay service with IDNXs.

▲▲▲

Frame Relay service via private lines from their premises to the nearest IDNX multiplexer. In October, Infolan-Frame Relay will be available in Belgium, Canada, Finland, France, Germany, Hong Kong, the Netherlands, Sweden, Switzerland, the U.K. and the U.S.

U.S. access will be available via IDNXs in Atlanta, Chicago, Dallas, Los Angeles, New York, San Francisco and Washington, D.C.

### Looking ahead

Moneton said that in 1993, Infonet will probably extend Infolan-Frame Relay into all the countries where its IDNX muxes are currently located. The other IDNX nodes are in Australia, Denmark, Ireland, Italy, Japan, Singapore and Spain.

Initially, Infonet will offer monthly flat-rate prices for Infolan-Frame Relay. According to Moneton, users will pay more to send frame relay traffic between continents than to send traffic within a continent, but declined to release specific pricing. Eventually, Infonet expects to support usage-based pricing.

Infolan-Frame Relay will be positioned as part of the company's Infolan family of LAN internetworking services, which were first introduced last summer.

Berge Ayvazian, a vice-president at The Yankee Group, a network consultancy in Boston, said that Infolan-Frame Relay will be attractive to Systems Network Architecture users because SNA traffic cannot be routed over the Infolan public router net. ■

**"We feel confident that [Infolan-Frame Relay] is right on time,"**  
Moneton said.

▲▲▲

in the second half of this year. But the international value-added network provider, based here, had never before released service details.

Infonet will support its international frame relay service with Network Equipment Technologies, Inc. (NET) IDNX multiplexers. Infonet currently uses IDNX muxes in 18 countries to support its global, T-1/E-1 backbone network.

Moneton said NET plans to ship by October a new card and software for the IDNXs, which will enable the multiplexers to act as frame relay switches.



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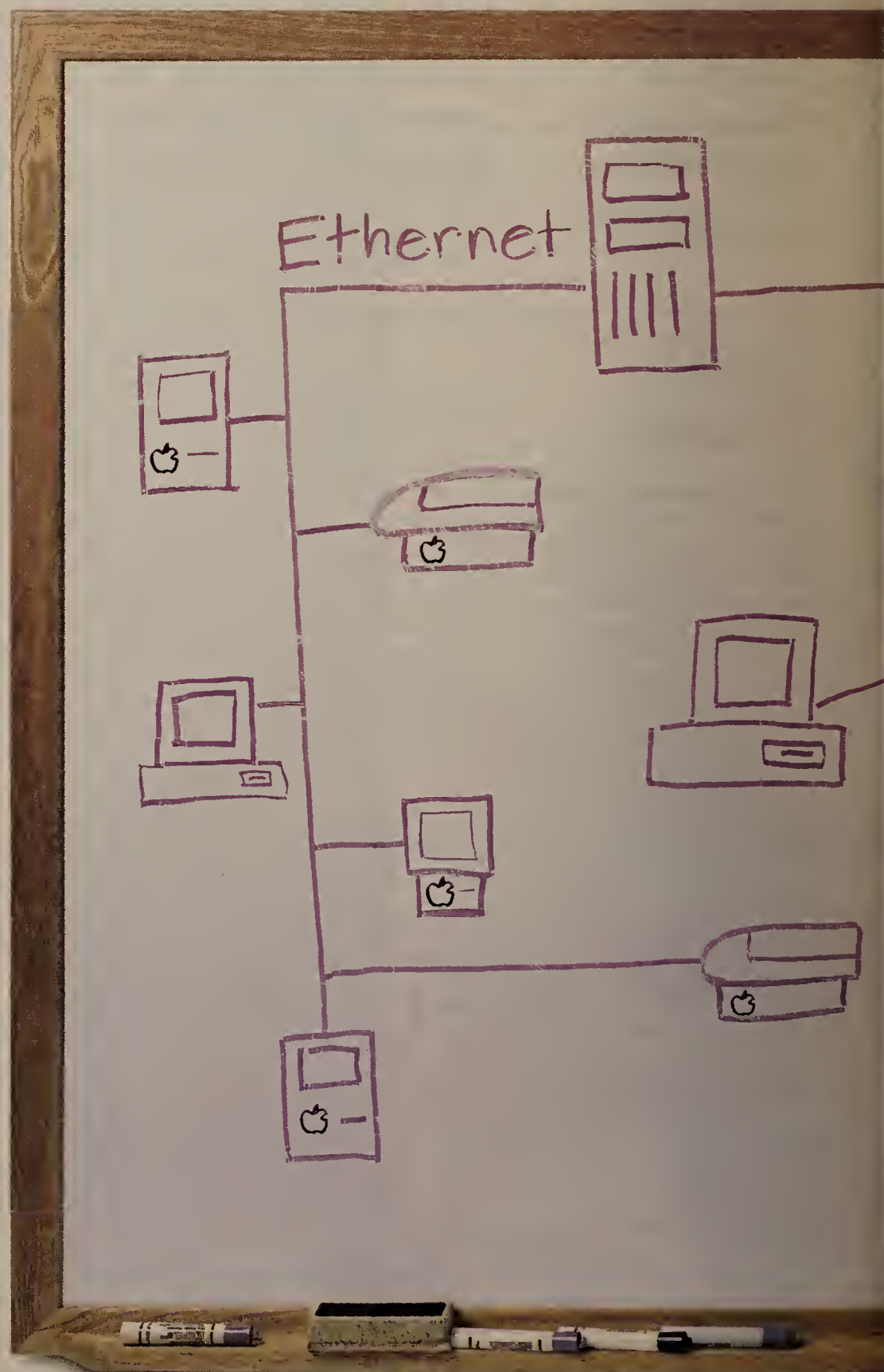
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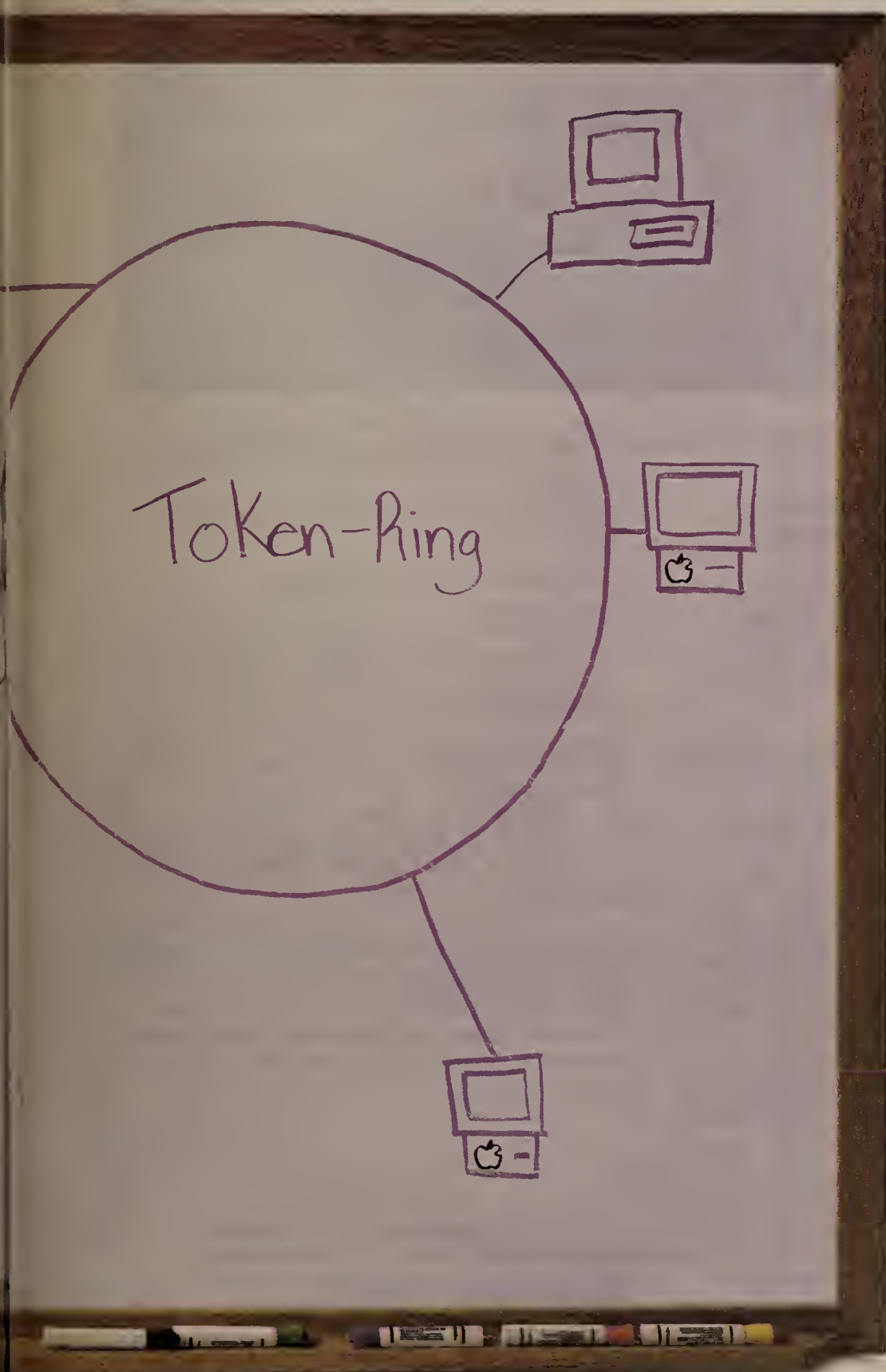
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# PRODUCTS & SERVICES

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## First Look

**Larse unveils T-1 DSU, enhances access mux**

**Larse Corp.** last week unveiled a new T-1 data service unit (DSU) as well as enhancements to its Diversi-T access multiplexer.

The new **Access-T plus DSU** combines the features of a mux, DSU and channel service unit. It offers four data terminal equipment ports and a drop-and-insert port. The ports multiplex V.35, RS-449 or EIA 530 inputs for connection to a single T-1 or fractional T-1 line. The unit can accommodate data rates up to 1.536M bit/sec in multiples of 56K or 64K bit/sec. Access-T plus is expected to be available midyear and is priced at \$5,000.

Larse also announced new inverse multiplexing and voice modules for its Diversi-T access mux. The **IMux** module combines 56K and 64K bit/sec channels for virtual high-speed dialed connections. The **PCM** voice module links phones, private branch exchanges, key systems and facsimile equipment. Together, they provide links to multiple net services through a single T-1 or fractional T-1 line.

Available this month, the IMux module costs \$4,100, and the PCM costs \$1,250.

For more information, contact Larse at (408) 988-6600.

**Rolm offers outsourcing, PhoneMail enhancements**

**Rolm Co.** recently announced its **Integrated Management Services (IMS)**, a new telecommunications outsourcing service, as well as enhancements to its PhoneMail voice-messaging system.

IMS will initially consist of help desk services, but Rolm plans to expand upon those offerings. The company said IMS will be priced on a per-customer basis.

Rolm also announced it has integrated its PhoneMail system with Siemens AG's HCM 200 and Saturn private branch exchanges.

PhoneMail integration with the HCM 200 is currently available, while Saturn integration will be available by March.

For more information, call Rolm at (203) 849-6000. ■

## SnapPROBE offers broad MIB support

By Joanne Cummings  
Staff Writer

SANTA CLARA, Calif. — Network Monitoring, Inc. (NMI) recently said it has redesigned its SNMP-based management software for Ethernet local-area networks to support a variety of extended Management Information Bases (MIB).

NMI's repackaged SnapPROBE software offers users support for MIB I and II functionality, with the option of adding other MIBs as needed.

Until now, SnapPROBE came with support for MIB I and II as well as Novell, Inc.'s LANtern network monitor.

With the new SnapPROBE Basic, customers receive standard support for MIB I and II and can choose from a range of options such as the LANtern software, the RMON MIB and extended MIBs from Banyan Systems, Inc., Cabletron Systems, Inc., Cisco Systems, Inc. and SynOptics Communications, Inc.

Like the original SnapPROBE, SnapPROBE Basic is software that resides in any Intel Corp.

80286-, 80386- or 80486-based personal computer running Microsoft Corp. Windows 3.0 and gathers statistics from LAN devices supporting MIB I or II.

The product also enables users to graphically display LAN traffic statistics on a central management console by polling Simple Network Management Protocol-compliant devices. It is compatible with any Ethernet card supporting Microsoft's Network Driver Interface Specification ("Firm introduces Windows-based net mgmt. tool," NW, Oct. 14, 1991).

### Optional support

NMI decided to offer support for LANtern and the other MIBs on an optional basis so users could pay only for the MIBs they need, according to Manh Do, president and chief executive officer of the company.

The original SnapPROBE was priced at \$1,995, whereas SnapPROBE Basic costs \$495, with each extended MIB module priced at \$1,195.

SnapPROBE Basic and the LANtern module are expected to be available this month. The RMON MIB module is scheduled for April availability, and the remaining extended MIBs are expected to be available in the third quarter.

For more information, contact NMI at (408) 986-1166. ■

## Beyond adds support for VINES, biz forms to E-mail

CAMBRIDGE, Mass. — Beyond, Inc. last week said it has ported its BeyondMail electronic mail software to run on Banyan Systems, Inc.'s VINES local-area networks.

The company also unveiled BeyondMail Forms Designer, a software tool that enables BeyondMail users to build customized electronic forms for the E-mail program, and announced its intention to provide a Microsoft Corp. Windows version of BeyondMail later this year.

The VINES support marks the first time Beyond has offered its product for a vendor-specific platform. Previously, BeyondMail supported the Message Handling System (MHS) transport protocol. Drew Lytle, product manager at Beyond, said the firm made the move because of VINES' superior addressing scheme.

"VINES' StreetTalk facility is a more robust addressing facility than that found in MHS," Lytle said. "VINES users can now keep the best features of VINES while gaining the power of Beyond-

Mail's user interface and rules-based language." He declined to provide specific pricing or availability for the VINES version.

Additionally, the company unveiled its Forms Designer tool, a Windows-based application that enables users to build custom-designed electronic forms for data entry use with BeyondMail Version 1.1, which was also announced last week.

According to Lytle, Beyond decided to make the tool Windows-based in preparation for its upcoming release of a Windows 3.1 version of BeyondMail. He said the forms product will support both the DOS and Windows version of the E-mail program.

The Forms Designer is available now for \$395. BeyondMail Version 1.1 is available now as a free upgrade for BeyondMail 1.0 users. A 10-node license costs \$995, and a 20-node expansion package costs \$1,695. Lytle declined to provide availability or pricing for the Windows version.

Beyond can be reached at (617) 621-0095. ■

## D&B taps Unix for client/server plans

Software giant strikes deals with DG, HP to port mainframe-based applications to Unix servers.

By Joanne Cummings  
Staff Writer

SAN FRANCISCO — Dun & Bradstreet (D&B) Software recently said it is teaming with Hewlett-Packard Co. and Data General Corp. to downsize its mainframe-based business applications to Unix servers for use in a client/server environment.

Analysts said the fact that D&B Software has chosen Unix — specifically HP and DG servers — as its server platform will provide a range of scalable servers that users can upgrade as their needs change.

The agreement fleshes out D&B Software's previously announced plans to move its traditionally IBM mainframe-based terminal-to-host applications to a client/server architecture ("Applications giant adopts client/server," NW, Aug. 5, 1991).

With the addition of HP's and DG's Unix expertise, the first set of D&B Software's Unix applications should be available this year, according to Bobby Cameron, director of client/server business applications at D&B Software.

As part of the deal, HP and DG will comarket, sell and support the new D&B Software applications.

### Break from OS/2

Until now, D&B Software's client/server announcements had focused primarily on the OS/2 platform, according to Tony Percy, a vice-president at Gartner Group, Inc. in Stamford, Conn.

"I think it's an obvious attempt to open up the choice and go with a more scalable platform," he said. "There are some question marks about OS/2's market share, and it isn't as scalable as Unix."

According to Steve Baxter, vice-president of corporate marketing at DG, the D&B Software applications will run without change across DG's entire range of AViON servers. "A small department of four people to large departments of 1,004 people could use the same software," he said.

Similarly, the software will run on HP's line of Reduced Instruction Set Computer-based HP 9000 Series 800 servers, according to Bernard Guidon, general manager of commercial Unix systems at HP.

"I think the opportunity for both HP and DG is very large because the client/server model — is one that easily wins the hearts of users," said Peter Kastner, vice-president of Aberdeen Group, Inc., a network consultancy in Boston. "HP and DG have an opportunity to grab applications as they migrate off the mainframe to the desktop."

D&B Software is basing its client/server strategy on open systems and plans to offer users a wide choice of computing platforms. It will initially deliver OS/2 and Unix server-based versions of the products, with client portions running under Microsoft Corp. Windows. The Windows support will be provided via Pow-

**"The client/server model is one that easily wins the hearts of users," Kastner said.**

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erBuilder, a tool from Powersoft Corp.

Eventually, D&B Software will offer users a choice of desktop environment as well, moving to support the Open Software Foundation, Inc.'s Motif interface, IBM's Presentation Manager and Apple Computer, Inc.'s Macintosh.

Cameron said the new software will also support a variety of standard connectivity platforms including Microsoft's LAN Manager, IBM's LAN Server, Novell, Inc.'s NetWare and Transmission Control Protocol/Internet Protocol.

Currently, D&B Software's mainframe applications fall into four categories: financial, materials management, human resources and manufacturing. Cameron said the first client/server products to become available will be reporting and decision-support applications.

He declined to provide pricing or exact availability dates for the new applications.

For more information, contact D&B Software at (508) 370-5146. ■



# OPINIONS

## TELEMARKETING

BY MARVIN PECK

# Autodialing computers: relief or revenge?

Last November, Congress passed a bill that was supposedly designed to give relief to the American public from the 18 million calls that are made daily by automatic dialer recorded message players (ADRMP). The bill's stated purpose is "to make it illegal for businesses to use . . . ADRMPs for unsolicited advertising to persons who have indicated that they do not wish to receive commercial telephone solicitations. . ."

To implement this decision, the Federal Communications Commission will be responsible for establishing a database of residential and business telephone customers that want to be excluded from receiving these calls. Unfortunately, the majority of business telephone customers do not qualify for inclusion on that list. Also, not all ADRMP owners will be required to refrain from calling those on the no-call list. Charitable organizations are exempt, but unfortunately, so are organizations conducting consumer surveys, public opinion polling and certain other survey research. And in a self-serving stroke of genius, Congress has also decided to exempt political organizations from the ruling.

**N**ot all ADRMP owners will be required to refrain from calling those on the no-call list.

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If you are an ADRMP owner and do not qualify as one of the organizations listed above, all is not lost. The bill will allow you to call those with whom you have an "established business relationship," even if they are listed in the database. This exemption is extended to businesses such as magazines, cable television franchises and newspapers, as well as credit card companies — even if a card holder hasn't recently used the card. In an apparent attempt to allow a maximum number of businesses to circumvent the restrictions, the bill also allows retailers and service providers to place calls to those who have made recent purchases from their business.

While Congress may think it has acted to significantly reduce the number of computer solicitations, a loophole in the bill may instead have legalized and fostered the growth of the ADRMP industry. There appears to be nothing in this bill to prevent newspapers, credit card companies and others from setting up their own ADRMP and placing calls to their customers on behalf of their advertisers. In fact, if the newspaper or credit card company doesn't want to set up its own ADRMP, it apparently can farm out the job to an existing owner of an ADRMP, just as it would a mass mailing.

Congress should be given credit for recognizing the enormous scope of this problem and attempting to do something about it. The Direct Marketing Association also deserves acknowledgment for admitting that "regulation is necessary due to the intrusive nature of these calls."

On Dec. 20, President Bush signed the bill into law.

Unfortunately, the law needs to be rewritten so that residential and business telephone lines on the no-call list are exempt from all calls, regardless of any existing business relationships. Rather than making a long list of companies that are exempt from the rules, any individual or company that wants to receive these calls should be given the option of whether to allow their name and address to be used for marketing purposes. We had an opportunity to prevent our nationwide telecommunications network from becoming clogged with junk phone calls. We have no one to blame but ourselves if we allow it to continue. ■

*Peck is a telecommunications analyst with Emory University in Atlanta.*

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Caryn Gillooly — Local Networking  
5423 Gladewright Drive  
Centreville, Va. 22020  
Phone: (703) 266-1537  
Fax: (703) 266-1543

Jim Duffy — Data Communications  
115 E. 27th St., #1C  
New York, N.Y. 10016  
Phone: (212) 481-3095  
Fax: (212) 679-0147

**Staff Writers**  
Maureen Molloy — Internetworking  
Joanne Cummings

**West Coast Bureau**  
Timothy O'Brien  
Bureau Chief/Network Software  
2088 Union Street, Suite 2  
San Francisco, Calif. 94123  
Phone: (415) 771-3530  
Fax: (415) 771-2817

**Washington D.C. Bureau**  
Anita Taff — Bureau Chief  
Phone: (202) 879-6744

Ellen Messmer — Correspondent  
National Place  
1331 Pennsylvania Ave. NW, Suite 505  
Washington, D.C. 20004  
Phone: (202) 879-6752

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Network World, 161 Worcester Road, Framingham, Mass. 01701  
(508) 875-6400, MCI Mail — 390-4868, Fax: (508) 820-3467

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## EDITORIAL

# Recent protectionist trend is bad news for net managers

The continuing recession and election year rhetoric have combined to raise the powerful — and potentially dangerous — specter of protectionism.

In the wake of President Bush's trade mission to Japan, which produced questionable results, the presidential hopefuls stumping in preprimary New Hampshire are stoking the flames of the trade issue.

And they're getting help from some high-level Japanese officials who should know better than to make such inflammatory remarks about U.S. shortcomings, particularly now.

All of this has ensured that protectionism will play a major role in this year's presidential campaign and has raised the possibility that some shortsighted trade actions could be taken.

While it's easy to get one's dander up over remarks about the intelligence and dedication of American workers as well as

the quality of U.S. goods, an international trade war would pose real problems for our economy and the information technology industry in particular.

Consider the trade issue from another perspective. Today, many of our largest software, computer and network vendors earn a substantial chunk — in some cases, more than 50% — of their revenue from abroad. The U.S. is still, by far, the dominating force in high technology, particularly in software.

By fighting to sell a larger portion of certain products abroad, such as rice or automobiles, we could endanger the growth of one of our most vital and important industries — high tech.

If we take the road of protectionism, we will likely fuel protectionism abroad — not just in Japan — and cut off lucrative growth markets. These are areas that lag behind the U.S. in adop-

tion of our key technologies, particularly network technologies, and offer rich opportunities for U.S. companies.

Europe and Japan have already exhibited a penchant for protecting and nurturing their high-tech sectors, and any protectionist moves on our part could strengthen the bond between their governments and their high-technology industries.

There's no doubt the U.S. must move quickly to resolve lingering trade issues with its major partners. We must ensure that unfair trading practices end by using both the carrot of continued openness of U.S. markets and the stick of narrowly focused penalties.

But everyone, politicians and pundits alike, should back down now from the brink of protectionism before we damage critical assets such as our information technology industry. ■



# OPINIONS

## THE FUTURE OF NETWORKING

BY JAMES HERMAN

### Net managers better brace themselves for a revolution

Information systems (IS) are now entering a revolutionary period. In the 1990s, fundamental restructuring in three major areas — hardware, software and business processes — will result in wholesale turnover of currently installed computer systems and application software.

The upcoming hardware revolution is the easiest to understand. Low-cost, commodity microprocessors are replacing highly specialized, expensive mainframes and minicomputers. By 1995, microprocessors capable of executing 250 million instructions per second will be hitting the market.

Increasingly, the advantages of the custom circuitry of mainframes are rapidly dwindling. Soon, it will cost more simply to maintain these behemoths than to replace them with networks that deliver far more capacity.

The usual argument for why microprocessors won't blow away older hardware is that mainframe application software isn't portable and will cost too much to recreate on new platforms. But software is also undergoing a revolution. Object-oriented software techniques are changing the way software is written and designed.

With object-oriented programming, objects interact by sending messages to one another — an easy way to take advantage of networks. Objects can easily be distributed across high-powered workstations and servers, creating a scalable architecture that can provide far more computing power than dinosaur mainframes running structured COBOL.

Finally, a powerful revolution may ultimately enable users to throw away all their old mainframe software. In business af-

terbusiness, analysts are finding that the key to competitive advantage is to change how the business operates in order to take advantage of advanced information technology. The problem with the current generation of applications is that they were designed around old, pre-computer business processes.

Today, businesses want to dramatically reduce the time it takes to design, deliver and service products. They also want to cut the number of people involved in these processes, which requires restructuring and sequencing of work tasks to take

**O**bject-oriented software techniques are changing the way software is designed.



advantage of instant availability of information across great distances. It also requires major reorganization, splitting up older functional organizations and replacing them with groups that are structured around service delivery processes.

As businesses restructure their processes and organizations, they will also recreate their applications and databases. As process restructuring takes off, the old applications just won't do the right thing any more. Incrementally fixing the older programs leads to a mess.

The new processes are often simpler, with fewer steps, and it's actually faster to produce new, clean applications that match the new processes than to patch the older ones.

The parallel revolutions in hardware and software will increase the incentive to start from scratch and make a break with the past. As applications migrate to distributed, micro-

processor-based platforms, the cost of servicing what's left on the mainframe increases. Eventually, the mainframe will be consumed in a death spiral of rising costs and an ever-widening gap in features and functions relative to the new platforms.

Chief information officers and MIS managers throughout the industry point to the one big flaw in this scenario: Where will the skilled application developers, system programmers and network managers needed to create this revolution come from? A whole generation of professionals experienced with mainframe applications would be put out of work because retraining takes a great deal of time and is extremely expensive. What will happen to the armies of MVS and VTAM system programmers out there?

In many organizations, older platforms and applications will outlive their usefulness because the IS support organization is incapable of replacing them. In other organizations, the problem will be solved through outsourcing. A few IS groups will figure out how to "reinvent" themselves. Workers undergoing radical changes in how they do their jobs are not likely to have a lot of sympathy for IS professionals who seem to be holding onto past approaches.

The real challenge facing network and IS managers is igniting and managing change processes that create more responsive, cost-effective IS and communications organizations. Responding to the revolutions in hardware, software and business processes will require empowering and motivating programmers, analysts, operators and technicians to embrace new technologies.

Achieving a shared vision of a new future for communications and IS organizations will be essential. Along the way, we may encounter a lot of dysfunction and chaos. Unfortunately, these are almost always the byproducts of revolution. ■

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## TELETOONS

BY FRANK AND TROISE



## LETTERS

### AT&T addresses toll fraud

I am writing this in reply to Ed Horrell's article titled "Vendors must warn users of toll fraud dangers," which appeared in the Jan. 20 issue.

I can only comment on AT&T's actions regarding unauthorized private branch exchange access during the past 18 months.

At both the 1990 and 1991 Definity 85 and National System 75 Definity Users Group fall conferences in San Diego and Miami, respectively, as well as at the Definity 85 User's Group spring conference in Boston, AT&T and members of those groups made joint presentations on unauthorized PBX access and toll fraud.

Additionally, at the 1991 fall conference, Sally York, president of the National System 75 Definity Users Group, and Tony Ackerman of AT&T Bell Laboratories presented a session titled How to secure your PBX equipment.

On March 15, an expanded version of that session will be

presented at the Definity 85 Users Group spring conference in Atlanta. This AT&T presentation will cover how to implement various security procedures on the System 75, Generic 1 and Generic 3 as well as Audix.

Tony Loeb  
President

Definity 85 Users Group

*Do you disagree with what you've read in Network World? Would you like to clarify a point? Write us a letter about it.*

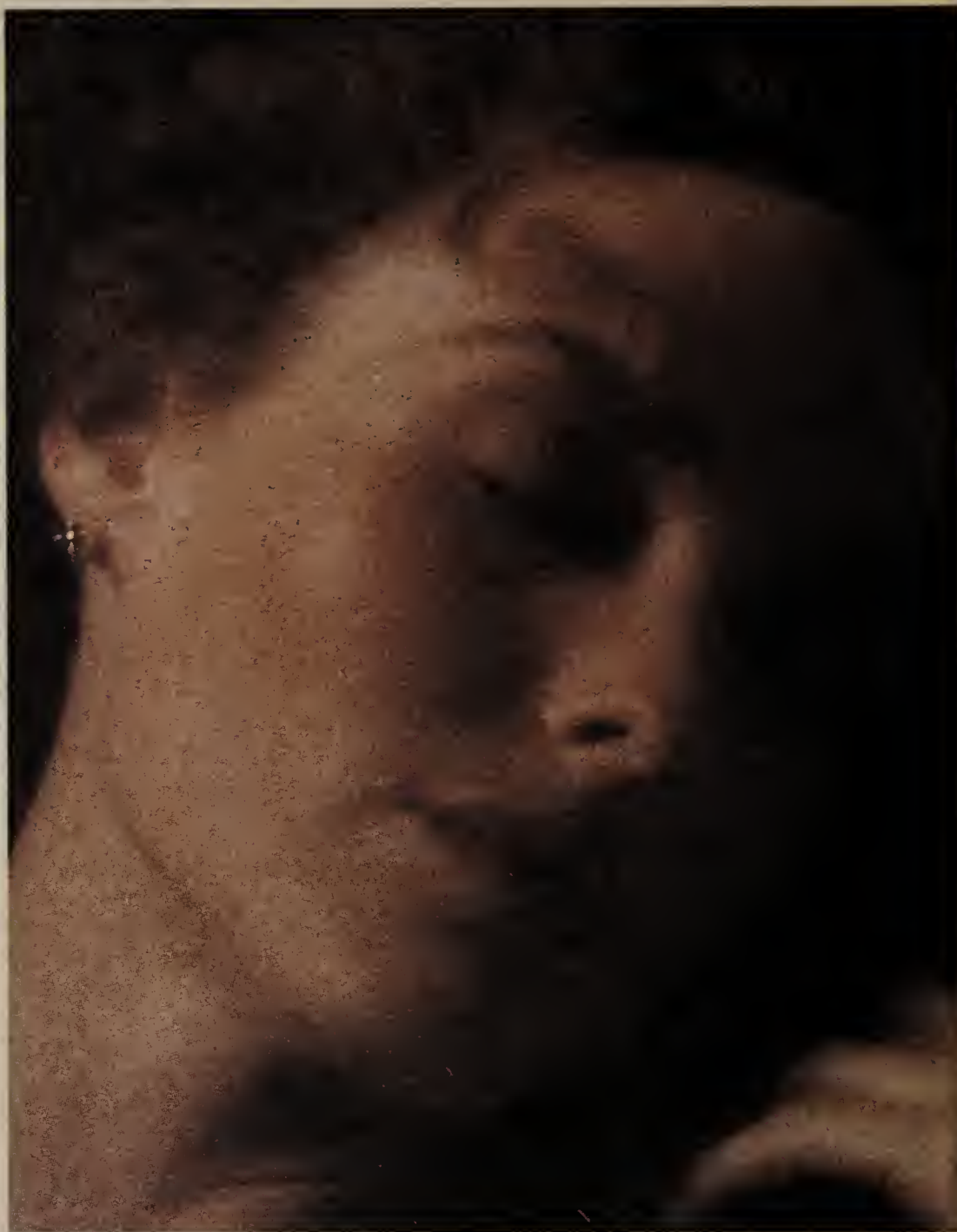
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D A T A C O M

# BUYER'S GUIDE

## FRAME RELAY

# Frame relay leads the pack

Amid all the hype for Synchronous Optical Network, Asynchronous Transfer Mode and Switched Multimegabit Data Service, a dark horse is overtaking that high-speed, wide-area networking pack. Frame relay has quickly become a viable alternative for supporting bursty applications such as local-area network interconnection over high-speed, wide-area circuits.

Frame relay also hit the scene

*Finn is an associate at TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy specializing in long-distance service analysts and network design. He can be reached at (201) 746-0200.*

### CHART • GUIDE

A Buyer's Guide chart comparing frame relay equipment begins on page 33, while a chart detailing frame relay services begins on page 36.

at just the right time, when a growing number of users were looking to do exactly what it does best — support high-speed LAN interconnection.

In contrast, Integrated Services Digital Network seems to be stagnating because it doesn't have a clear application.

The backers of ISDN were never able to get vendors, carriers and standards body consensus to create an ISDN method for providing LAN-to-LAN connectivity.

Carriers and hardware vendors are rushing to bring frame relay equipment and services to the market, and users are eager to receive them.

But making choices between public and private nets brings up a host of customer premises equipment issues that are addressed in the accompanying charts and sidebar.

### Change is constant

The first carrier to enter the frame relay service market was WilTel in March 1991. Since then, the market has become extreme-

ly competitive and confusion over service pricing has reigned supreme.

Both WilTel and US Sprint Communications Co. are already in their second review of pricing strategies, while AT&T and MCI Communications Corp. are hoping to roll out their initial offerings and pricing plans in the first half of this year.

It will probably take the carriers well into the second half of 1992 to settle into long-term pricing strategies, according to Tom Walton, president of Walton and Walton Associates, an industry consulting firm based in Richmond, Va.

Each carrier has established frame relay backbones through their respective networks. Because none of the carriers have interconnected their frame relay backbones, users are effectively limited to selecting a single carrier. This prevents a user from sending traffic from a site served by one carrier's frame relay service to a site served by another's.

Differences in the way carriers

implement international standards also limits users to a single carrier.

Carriers vary greatly in their implementation of CCITT Q.922, which defines the structures of frames, and there is no shortage of philosophical differences over standards among the providers.

Where this is most apparent is the area of congestion management.

Congestion management is a  
(continued on page 32)

**Frame relay emerges amid a field of high-speed data services to become the front-runner.**

By CHRIS FINN



(continued from page 31)

critical issue in frame relay because it prevents network switches from being overwhelmed by more traffic than they can process. While the CCITT frame relay recommendation outlines several methods for congestion avoidance and recovery, none is mandatory. Also, each carrier has its own implementation of the standard, so that two carriers may use the same term but mean two different things.

A good example of such ambiguity is the term committed information rate (CIR). Broadly, CIR is a given amount of bandwidth that users can expect on a given Permanent Virtual Circuit (PVC), which establishes a logical connection between two points in a frame relay network. But each carrier has its own definition of this key term. CIR defines the amount of bandwidth the carrier guarantees will be available to the user.

US Sprint views CIR in a TDM sense, meaning it will provide the given CIR on a particular PVC all the time. The other carriers tend to view CIR in a statistical multiplexing sense, meaning that CIR should be considered a statistical amount of bandwidth that a particular PVC will have available over an extended length of time.

US Sprint's Reserved Service uses CIR and is the only one to allow long-term bursts as high as the full speed of the PVC. There is no absolute time limit per burst. The carrier's customers have the full speed of the PVC unless the network experiences congestion.

US Sprint is also the only carrier to offer a non-CIR service, called Standard Service. The service sets a designated discard-eligible (DE) bit in the header of each frame. Standard Service is ideal for locations with sporadic noncritical transmissions. When the network experiences congestion, frames marked with a DE bit are discarded until the network returns to normal. In exchange for letting the carrier discard frames to avoid congestion, Standard Service customers receive a price break over Reserved Service customers.

Reserved Service customer data that exceeds the CIR is also marked with a DE bit, enabling US Sprint to discard these frames when the network is congested. This allows varying levels of service and pricing for different links under the carrier's program.

Network managers using US Sprint's service will be faced with a dilemma. If long-term bursting above CIR is allowed, then managers may question paying extra for additional CIR or for any CIR at all. If a burst of data at the access circuit's full speed can be sent when the network is not congested, why pay for a guarantee of CIR? US Sprint hopes customers will not abuse the network, but there are no explicit measures

to stop them.

US Sprint will guarantee its customers a minimum throughput equal to the subscribed CIR, except when the network remains congested even after all frames with the marked DE bit have been discarded. At that point, all reserved customers will "lose frames equally" through a fairness algorithm, according to Vini Handler, manager of US Sprint's enhanced data services.

While this seems to be a guarantee of throughput, discarding frames can cause further congestion because customer applications will resend lost frames.

The ceiling on charges for US Sprint's Standard Service links is \$195 per month, while the charge for a link with a CIR of between 19.2K and 1.024M bit/sec ranges from \$230 to \$3,560.

Taking a different approach to congestion management, WilTel follows the doctrine of "delay, not discard," says Chris Heckart, WilPak product manager. This means WilTel does not actively set the DE bit. Instead, it denies bandwidth access to users coming onto the network until congestion eases.

So far, computer software provider Sybase, Inc. of Emeryville, Calif., is happy with the WilPak service. The company replaced leased lines with the WilPak service last February. "We find WilPak's performance equals that of leased lines at a substantial cost savings," says Jim Mathesen, corporate manager of telecommunications at Sybase.

Although the carriers employ differing network software, AT&T and CompuServe, Inc. are using the same StrataCom, Inc. IPX T-1 multiplexer as WilTel in their frame relay service backbones and follow the philosophy that bursting above CIR should be momentary.

CompuServe offers CIR in 4K bit/sec increments so it can fine-tune low-speed customer networks. CompuServe's Framenet customers that experience frame-loss can add CIR in small amounts until network performance is adequate.

AT&T will employ a sophisticated network management center to actively avoid congestion and also offer the customer a Simple Network Management Protocol-based management terminal to monitor network traffic flows.

MCI does not yet offer a frame relay service. Availability of MCI's Virtual Private Data Service Frame Relay is scheduled for mid-year. The carrier is planning to use a T-3 cell relay-based backbone in order to avoid congestion.

MCI has chosen to follow its own path, using a Siemens-Stromberg Carlson switching platform. SNMP terminal management is planned for the end of this year.

BT North America, Inc. is

planning to update its service with higher speeds and a comprehensive congestion management package in the fourth quarter of 1992. Frame relay will also come under the British Telecommunications PLC Concert network management umbrella at that time.

### Congestion cures

Two frame relay terms that are often misunderstood are Forward Explicit Congestion Notification (FECN) and Backward Explicit Congestion Notification (BECN), which are the explicit congestion notification bits outlined in the CCITT standard. These bits notify end-user devices of impending congestion in the network, warning them to slow down or risk losing frames.

The consensus of the carriers is that while FECN and BECN are great in concept, their advantage would fall apart in practice because vendor support is practically nonexistent. No current router can act upon the FECN and BECN bits, and only Wellfleet Commu-

nications, Inc. currently makes a product that reads these bits.

However, AT&T has begun offering a customer premises SNMP network management terminal with which a user can monitor traffic flows and determine how the network is performing. A manager can literally see those links that exceed CIR and increase CIR as needed, and customers can assure themselves that service parameters are being met.

Other carriers will soon follow AT&T's lead and offer SNMP management. WilTel's Heckart predicts an SNMP offering before the end of the year, while Andy May, director of network services for CompuServe's offering says Framenet will feature SNMP support by mid-1992.

### Pricing problems

Frame relay can be an extremely cost-effective alternative to traditional T-1 multiplexing for supporting applications that generate data in large bursts. Carriers estimate frame relay can

provide savings of as much as 48%, due in large part to the on-demand nature of frame relay.

Another point making frame relay more economical than T-1 circuits is its ability to carry IBM Systems Network Architecture traffic in conjunction with LAN-to-LAN traffic over a single access circuit. Applications can use the full speed of the access line for a short burst and then relinquish it so that other applications can use it. This ability to dynamically share bandwidth is the key to frame relay's economy.

Frame relay can present a single network architecture for everything from personal computers to mainframes. However, users trying to compare prices for services will find many hurdles. Different pricing schemes, access issues, term and revenue plans, and customized pricing combine to muddy generic comparisons. Nothing short of a full carrier proposal will give a manager an idea of the true cost.

It is, however, useful to dis-

(continued on page 35)

## Vendors rush into frame relay market

The rush of service providers into the frame relay market has been paralleled among customer premises equipment vendors. More than 60 vendors will have introduced frame relay or frame relay-compatible customer premises equipment by the middle of the year.

The equipment falls into one of many categories, and most of the hardware technology is familiar to users with background in X.25 networks. Some equipment, such as frame relay switches and frame relay assembler/disassemblers, sport new architectures designed to mesh with frame relay. Existing routers and concentrators are being outfitted with frame relay interfaces or retrofitted to support the technology.

Even this generalization breaks down quickly, because many of the time-division multiplexer (TDM) manufacturers are adding frame relay interfaces to their switches in order to broaden the functionality of their products.

Netrix Corp., with its #1-ISS, can handle TDM, circuit switching, frame relay and X.25 packet switching with the same modular architecture.

The accompanying charts list a broad range of equipment for both public and private frame relay networking. With the constant change in this market, users are encouraged to contact the vendors directly for full details on the listed products.

Some generic statements are appropriate, however. One of the biggest issues for frame re-

lay equipment hunters is interoperability of vendors' devices. This is particularly true as the frame relay industry girds to complement leased lines — such as permanent virtual circuits (PVC) — with a switched virtual circuit capability, which establishes dial-up connections between devices.

### ANSI compliance key

To be interoperable, the equipment needs to comply with relevant ANSI standards, notably T1.606, T1.617 and T1.618, that govern the service description, access signaling and core aspects of frame relay. These map to the corresponding CCITT standards, I.233, Q.922 and Q.933, respectively.

In September 1990, an interim specification for the Local Management Interface (LMI) was developed as a method of exchanging status information between the network and end-user devices such as routers. This specification has been incorporated into portions of the ANSI standards mentioned above and made compatible with the CCITT standards.

In looking at the various offerings on the market, there are a number of basic must-have features users should look for when buying equipment for their frame relay applications. These include:

- Compliance with ANSI T1.606, the Addendum to ANSI T1.606, ANSI T1.618 and the PVC status procedures of ANSI T1.617.
- The ability to review Data Link Connection Identifier bits in the frame relay header field for es-

tablishing a connection between two devices.

- At least the transmission of, if not review of, all other bits in the frame relay header field.

- The ability to set the discard-eligible bits that identify which frames can be discarded if the network becomes congested.

- The ability to review the Frame Check Sequence of every frame before sending the frame to its destination. This is a requirement of the Link Access Procedure D used in the Integrated Services Digital Network D channel, as specified in CCITT Q.921.

- The ability to use the Forward Explicit Congestion Notification and Backward Explicit Congestion Notification bits for congestion notification.

- Support of a fairness doctrine that calls for the monitoring of throughput on the network and adjudicating instances where congestion occurs.

- Support of PVC status signaling in keeping with the LMI specification.

- Provisions for carrying IBM Systems Network Architecture and other synchronous traffic via frame relay.

- And expandability of the system through software add-ons.

These are just some of the features users should look for when selecting a frame relay hardware vendor. Most equipment providers have a checklist they furnish for buyers. This can be invaluable for giving insight to vendor offerings, so users should collect them for the sake of comparison.

— Chris Flinn



Frame relay equipment (continued on page 34)

Company	Product	Product type	Access speeds/trunk-side speeds (bit/sec)	Standards supported	Capacity of switches/capacity of frame relay interface (bit/sec)	Types of traffic carried on the backbone	Carrier compatibility testing	Price/Availability
Adax, Inc. Berkeley, Calif. (510) 548-7047	Frame Relay for UNIX	Access and switch	56K, 64K, 256K, 512K, 1.536M and 2.048M/56K, 64K, 256K, 512K, 1.536M and 2.048M	LMI, Annex D	6M (386/486) and 16M (Reduced Instruction Set Computer, VME)/2M	Voice, video and any type of data	Testing not yet completed	Software/CPU, \$395; SBus Card, \$2,250; PC Card, \$2,570; and VME Card, \$3,785/Now
Advanced Computer Concepts, Inc. Santa Barbara, Calif. (800) 444-8854	ACS 4100 Bridge/Router	Access	56K, 64K, 256K and 512K/NA	LMI, Annex D and ANSI Q.922 (FECN/BECN implementation is pending handling standard)	NA/1.054M	HDLC, LAP B, X.25, frame relay, DEC DECnet, IP, Apple Computer, Inc. AppleTalk, OSPF, Novell, Inc. IPX and Xerox Corp. XNS	WiTel	\$5,500 to \$7,000 per module/Now
	ACS 4200 Bridge/Router	Access	56K, 64K, 256K, 512K, 1.536M and 2.048M/NA	LMI, Annex D and ANSI Q.922 (FECN/BECN implementation is pending handling standard)	NA/2.048M	HDLC, LAP B, X.25, frame relay, DECnet, IP, AppleTalk, OSPF, IPX, XNS	BT North America, Inc. and WiTel	\$7,500 to \$9,000 per module/Now
	ACS 4400 Bridge/Router	Access	56K, 64K, 256K, 512K, 1.536M and 2.048M/NA	LMI, Annex D and ANSI Q.922 (FECN/BECN implementation is pending handling standard)	NA/1.054M to 2.048M	HDLC, LAP B, X.25, frame relay, DECnet, IP, AppleTalk, OSPF, IPX and XNS	BT North America and WiTel	\$2,750 to \$7,375 per module/Now
Amnet, Inc. Framingham, Mass. (508) 879-6306	Nucleus 7000	Switch	2.4K, 4.8K, 9.6K, 19.2K, 48K, 56K, 64K, 128K, 256K, 512K, 1.536M and 2.048M/9.6K, 19.2K, 48K, 56K, 64K, 128K, 256K, 512K, 1.536M and 2.048M	LMI, Annex D, FECN/BECN	16M/2.048M	Asynchronous, SNA/SDLC, X.25, Novell NetWare, frame relay, voice and video	BT North America	\$400 per port/Frame relay available May 1992; all other protocols available now
AT&T Network Systems Bridgewater, N.J. (800) 247-1212	BNS-1000	Switch	Subrate, fractional T-1, 64K, 256K, 512K, 1.544M and 2.048M/subrate, fractional T-1, node-to-node T-1, node-to-node E-1, 64K, 256K, 512K, 1.544M, 2.048M and 8M	LMI, Annex D, FECN/BECN and DE	30,000 end points/4M	Asynchronous, HDLC, SDLC and X.25	Testing not yet completed	\$32,600/Now
Ascom Timeplex, Inc. Woodcliff Lake, N.J. (800) 669-2298	FrameServer	Access and switch	4.8K to 2.048M/4.8K to 2.048M	LMI, Annex D and FECN/BECN	10,000 64-byte frames per second/2.048M	HDLC, SDLC and direct LAN termination	WiTel (TIME/LAN 100)	From \$13,500 (4 ports) to \$25,500 (12 ports)/Second quarter
BBN Communications Corp. Cambridge, Mass. (617) 873-4000	T/300 PSN	Switch	9.6K, 56K, 64K, 256K, 512K, 1.536M and 2.048M/2.4K to 2.048M	LMI, Annex D and FECN/BECN	TBA	SNA, BSC, asynchronous and X.25	Testing not yet completed	Priced as part of total system; no additional pricing for frame relay software/Now
Cisco Systems, Inc. Menlo Park, Calif. (415) 326-1941	Cisco AGS+, MGS Router, CGS Router and IGS Router	Access	Up to 100M/9.6K to 50M	LMI, Annex D and FECN/BECN	NA/Up to 50M	TCP/IP, Novell IPX, Transport Bridging, Source Route Bridging, SDLC Transport, DECnet IV and V, XNS, OSI and AppleTalk I and II	BT North America, CompuServe, Inc. and WiTel	\$750 and up/Now
Digital Link Corp. Sunnyvale, Calif. (408) 745-6200	DL100 Digital Service Multiplexer, DL551VX-FT Fractional T-1 DSU/CSU and DL551VIIM-FT Fractional T-1 DSU/CSU	Access	1.536M/56K to 1.536M in increments of 56K or 64K	AT&T Pub 54019A (Fractional T-1), AT&T 54016 and ANSI T1.403 (Extended Superframe)	1.536M/1.536M	Voice and video	WiTel	DL100 Digital Service Multiplexer, \$3,695 and up; DL551VX-FT Fractional T-1 DSU/CSU, \$3,495 and DL551VIIM-FT Fractional T-1 DSU/CSU, \$5,500 for multiline shelf and power supply; \$2,585 for each DSU/CSU module/Now
Dowty Communications, Inc. Cherry Hill, N.J. (609) 424-4451	FPX-2000	Access, switch and mux	56K, 64K, 256K, 384K, 512K, 1.536M, 2.048M and 45M, ISDN BRI and PRI (E-3 planned)/56K, 64K, Nx64K, 1.536M, 2.048M and 45M, ISDN BRI and PRI (E-3 planned)	LMI, Annex D and FECN/BECN	196M/196M	Voice, video and direct 802.3 Ethernet	Testing not yet completed	Price not finalized/Third quarter
	DGP4802 Bridge Router	Access	Any Nx56/64K speed, 1.536M and 10M/56K, 64K, 1.536M and fractional T-1 compatible	LMI and Annex D	20M/4.1M	Voice and video	WiTel	\$3,300 to \$7,000/Now
	PSX 8000 Series	Access and switch	56K, 64K, 256K and 512K (1.536M and 2.048M planned for this year)/56K, 64K, 256K and 512K (1.536M and 2.048M planned for this year)	LMI and FECN/BECN (Annex D planned)	80M/80M	Voice and video	Testing not completed yet	Prices vary/Second quarter of 1992
	SeaNet Multi-protocol Router	Access	10M Ethernet/ Nx56/64K, 1.536M and 2.048M	LMI and Annex	8M/2M	Voice and video	Testing not yet completed	Base unit, \$7,720; additional ports, \$1,725/Now; frame relay upgrade in second quarter
Dynatech Communications, Inc. Woodbridge, Va. (703) 550-0011	CPX 10 and 20	Switch	1.2K to 2.048M/1.2K to 128K	LMI, Annex D and FECN/BECN	8M to 2.048M/128K	X.25, X.32 and frame relay	WiTel (CPX 20)	\$2,650 and up/Now
	CPX-SYNC	Access	1.2K to 2.048M/1.2K to 128K	LMI, Annex D and FECN/BECN	8M to 2.048M/128K	X.25, X.32 and frame relay	WiTel	\$4,000 to \$20,000/Now
Eicon Technology Corp. Lachine, Quebec (514) 631-2592	Router for NetWare	Access	NA/384K	LMI, Annex D and FECN/BECN	TBA	TBA	CompuServe	Software and hardware from \$995/March

BECN = Backward Explicit Congestion Notification  
 BRI = Basic Rate Interface  
 DE = Discard-eligible bit  
 DSU/CSU = Data service unit/channel service unit  
 FECN = Forward Explicit Congestion Notification  
 LAP B = Link Access Procedure B

LMI = Local management interface  
 NA = Not applicable  
 OSPF = Open Shortest Path First  
 PRI = Primary Rate Interface  
 TBA = To be announced

This chart includes a representative selection of frame relay equipment. These vendors may offer other equipment, and other vendors not included may offer a full range of products.

SOURCE TELECHOICE INC. MONTCLAIR, N.J.



NETWORK WORLD

Frame relay equipment (continued from page 33)

Company	Product	Product type	Access speeds/trunk-side speeds (bit/sec)	Standards supported	Capacity of switches/capacity of frame relay interface (bit/sec)	Types of traffic carried on the backbone	Carrier compatibility testing	Price/Availability
FastComm Communications Corp. Sterling, Va. (800) 521-2496	F2500X FRAD	Access	56K and 64K/1.2K to 19.2K	LMI, Annex D and FECN/BECN	NA/64K	Voice, video, BSC, SDLC, HASP and Poll-Select	WiTel; under testing with CompuServe and US Sprint Communications Co.	\$4,500 for SNA/BSC/Now
	F8110X Channelized Link Controller	Access, switch and concentrator	56K, 64K, 256K, 512K, 1.536M and 2.048M/1.536M, any V.35 clock to 1.5M	LMI, Annex D and FECN/BECN	3M/1.5M	Voice, video, HDLC and X.25	WiTel	\$17,500/Now
	FastPak FR/TR	Access	56K, 64K and 256K as well as 4M and 16M token ring/Up to 256K	LMI, Annex D, FECN/BECN and token ring	16M/256K	Token Ring	Testing not yet completed	TBA/Second quarter
	FastPak Software Module	Access	56K, 64K and 256K/Up to 56K, 64K	LMI, Annex D and FECN/BECN	NA/NA	Voice, video and asynchronous	Testing not yet completed	\$4,000 for software only/Now
Frame Relay Technologies, Inc. Costa Mesa, Calif. (714) 668-0222	FrameMux 1100	Access and mux	Up to 384K/Up to 1.536M	LMI, Annex D, DE and FECN/BECN	1.5M/1.536M	Frame relay network, frame relay user, voice, fax, SNA, asynchronous and synchronous pass-through (such as SNA/SDLC, routers and HDLC/X.25)	CompuServe	\$11,730 and up/Now
	FrameMux 1200	Access, mux and switch	Up to 1.536M/Up to 2.048M	LMI, Annex D, DE and FECN/BECN	3M (32M bus)/2.048M	Frame relay network, frame relay user, voice, fax, SNA, asynchronous and synchronous pass-through (such as SNA/SDLC, routers and HDLC/X.25)	CompuServe	\$22,770 and up/Now
Hughes Network Systems, Inc. Germantown, Md. (301) 601-4018	FRS9000	Access and switch	56K, 64K, 256K, 512K, 1.536M and 2.048M (also any T-1 or E-1 substrate)/56K, 64K, 256K, 512K, 1.536M and 2.048M (also any T-1 or E-1 substrate)	Annex D and FECN/BECN	20M/4.0M	Voice, X.25, SNA/SDLC, asynchronous, BSC, frame relay and transparent data	WiTel	\$2,000 to \$4,000 per port/Now
ISDN Systems Corp. Vienna, Va. (800) 666-4721	FX-512 Frame Relay PC Adapter	Access	56K, 64K, 256K, 512K/56K, 64K, 128K, 256K, 384K and 512K	LMI, Annex D and FECN/BECN	NA/512K	Video, fax (over frame relay Group 3 fax) and SNA	Testing not yet completed	\$686 for 1 to 3 units; \$655 for 4 to 10 units/Now
NEC America, Inc. Melville, N.Y. (800) 626-3349	NEDIX AF220	Access and switch	56K, 64K, 256K, 512K, 1.536M and 2.048M, up to 10M/1.536M and 2.048M (up to 10M if available from common carrier)	LMI and FECN/BECN	264M/20M	Voice, X.25, SNA, BSC, asynchronous, fax and any LAN	Testing not yet completed	\$5,450 per unit/May
Netrix Corp. Herndon, Va. (703) 742-6000	#1-ISS	Switch and mux	9.6K, 14.4K, 19.2K, 56/64K, 256K, 512K, 1.536M and 2.048M (also any increment of 8K)/9.6K, 14.4K, 19.2K, 56/64K, 256K, 512K, 1.536M and 2.048M (also any increment of 8K)	LMI, Annex D, FECN/BECN, committed information rate, DE	24M/2.048M	Voice, video, X.25 and any type of data	Testing not yet completed	Starts below \$10,000 and depends on configuration/Now
Network Equipment Technologies, Inc. Redwood City, Calif. (415) 780-5394	Not yet named	Access and switch	56K, 64K, 256K, 512K, 1.536M, 2.048M and Nx64K/Nx64K to 2.048M	LMI, Annex D, FECN/BECN and DE	80M/2.048M	Voice, video, LAN, fax, image and any data	Testing not yet completed	Not available/Third quarter
Newbridge Networks Herndon, Va. (703) 834-3600	3600 FRS	Switch	56K, 64K, 256K, 512K, 1.536M and 2.048M/56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)	LMI and Annex D (available in May)	2.048M(per card)/2.048M	Voice, video, data, fax, LAN, any synchronous or asynchronous data	Testing not yet completed	\$7,500 for 30-port card/Now
	8230 Little Bridge	Access	56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)/56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)	LMI and FECN/BECN	NA/4M	Voice, video, data, fax, LAN and any synchronous or asynchronous data	Testing not yet completed	\$1,700/Now
	FastBus FRS	Switch	256K, 512K, 1.536M and 2.048M (with integral CSU)/56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)	LMI, Annex D and FECN/BECN	16M/100M	Voice, video, data, LAN, fax, synchronous and asynchronous	Testing not yet completed	\$10,000 for 4M bit/sec interface card/May
	8100 FRR	Access	56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)/56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)	LMI, Annex D and FECN/BECN	NA/26x 2.048M	Voice, video, data, LAN, fax, synchronous and asynchronous	Testing not yet completed	\$6,500 and up/Now
	3604 FR-PAD	Access	56K and 64K/56K and 64K	LMI, Annex D and FECN/BECN	NA/26x 2.048M	Voice, video, data, LAN, fax, synchronous and asynchronous	Testing not yet completed	Not yet released/Summer
	ITB-TRB	Access	56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)/56K, 64K, 256K, 512K, 1.536M and 2.048M (with integral CSU)	LMI, Annex D and FECN/BECN	NA/2.048M	Voice, video, data, LAN, fax, synchronous and asynchronous	Testing not yet completed	\$8,500/Remote Token Bridge version available now; frame relay interface available in spring
Northern Telecom, Inc. Richardson, Texas (214) 301-7500	DPN-100	Switch	56K, 64K, 256K, 512K, 1.536M and 2.048M/56K, 64K, 256K, 512K, 1.536M and 2.048M	LMI and FECN/BECN	12M/1.6M	SNA, X.25, asynchronous and token ring	Testing not yet completed	Onetime, right-to-use software license fee of \$70,000; hardware pricing depends on port speeds/Second quarter
	DMS SuperNode DataSPAN	Switch	56K, 64K and 1.536M/1.536M and 4M	LMI and FECN/BECN	Modular in increments of 45M and 3.060M total/1.534M	Variable bit rate traffic	WiTel	Not available/Now

BECN = Backward Explicit Congestion Notification  
 BRI = Basic Rate Interface  
 DE = Discard-eligible bit  
 DSU/CSU = Data service unit/channel service unit  
 FECN = Forward Explicit Congestion Notification  
 LAPB = Link Access Procedure B  
 LMI = Local management interface  
 NA = Not applicable  
 OSPF = Open Shortest Path First  
 PRI = Primary Rate Interface  
 TBA = To be announced

This chart includes a representative selection of frame relay equipment. These vendors may offer other equipment, and other vendors not included may offer a full range of products.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.



NETWORK WORLD

Frame relay equipment

Company	Product	Product type	Access speeds/trunk-side speeds (bit/sec)	Standards supported	Capacity of switches/capacity of frame relay interface	Types of traffic carried on the backbone	Carrier compatibility testing	Price/Availability
Proteon, Inc. Westborough, MA (508) 898-2800 (still waiting)	P4100t; CNX 500	Bridge/routers	56K, 64K, 256K, 512K, 1.536M and 2.048M/2.048M	LMI, Annex D and FECN/BECN	NA/T-1 and E-1	To be determined	CNX 500 tested with WiTel, both models under testing with BT North America	\$10,000 to \$20,000, depending on configuration/Now
Racal-Datacom Sunrise, Fla. (305) 846-1601	FRM	Access, switch and mux	56K, 64K, 256K, 512K, 1.536M, 2.048M/Up to 1.536M	LMI, Annex D, FECN/BECN and DE	3M and 32M/T-1	Voice, fax, X.25, asynchronous, SNA, synchronous pass through, SNA/SDLC, Brouters, HDLC and X.25	Testing not yet completed	\$25,000 (integrated with Racal NMS)/Now
	RCP	Access, switch and mux	56K, 64K, 256K, 512K, 1.536M and 2.048M/Up to 2M	LMI, Annex D, FECN/BECN and T1.618	128M/2M	Video, SNA/SDLC, Novell IPX and X.25	Testing not yet completed	Start below \$8,000/July
Siemens Stromberg-Carlson Boca Raton, Fla. (407) 955-6373	FRSU	Access	1.536M and 2.048M/45M and 140M	LMI, Annex D and FECN/BECN	45M/34.4M	Voice and video	Testing not yet completed	Not available/1992-1993
Sprint International Reston, Va. (703) 689-6000	TP4900	Switch	56K, 64K, 256K, 512K, 1.536M and 2.048M (available mid-1992)/1.536M and 2.048M (available mid-1992)	LMI, Annex D, and FECN/BECN	30M/2.048M	Asynchronous, SDLC, X.25, X.75	Testing not yet completed	Varies by model and configuration/Now
	TP7900	Mux	56K, 64K, 256K, 512K, 1.536M and 2.048M/2.048M	LMI	32M/2.048M	Voice and video	Testing not yet completed	Varies by model and configuration/Now
StrataCom, Inc. Campbell, Calif. (408) 294-7600	IPX	Switch, mux	56/64K, 112K, 128K, 168K, 192K, 224K, 256K, 336K, 384K, 448K, 512K, 672K, 768K, 772K, 896K, 1.024M, 1.344M, 1.536M, 1.920M, 2.048M; up to 1.536M/2.048M, 45M	LMI, Annex D and FECN/BECN	32M/2.048M	Voice, video and any data	Tested with CompuServe and WiTel, under testing with BT North America	\$14,000 (frame relay card set)/Now
Sync Research, Inc. Irvine, Calif. (714) 588-2070	NAC	Access	56K, 64K, 128K and subrate 56K/Up to 128K	LMI, Annex D and FECN/BECN	NA/128K	SDLC, BSC, asynchronous, X.25, NCR polled asynchronous, polled asynchronous, and SDLC to Token Ring	CompuServe and WiTel	\$5,650 and up/Now
	SNAC	Access	56K, 64K, 128K and subrate 56K/Up to 128K	LMI, Annex D and FECN/BECN	NA/128K	SDLC, BSC, asynchronous, X.25, NCR polled asynchronous, polled asynchronous, Uniscope UTS, SDLC to Token Ring	CompuServe	\$5,650 and up/Now
Telematics International Fort Lauderdale, Fla. (914) 359-6370	DX-Digital Wideband Exchange	Switch and mux	56K, 64K, 256K, 512K, 1.536M, 2.048M and any Nx64K speed/1.536M, 2.048M and any Nx64K speed	LMI, Annex D and FECN/BECN	25M/8M	Voice, video, V.35, RS-449 and RS-232	Testing not yet completed	Not available/Third quarter
3Com Corp. Santa Clara, Calif. (800) 638-3266	NETBuilder	Bridge/router	10M/9.6K to 7.1M	LMI, Annex D and FECN/BECN	NA/Up to 7.1M	Bridging, TCP/IP, OSI, XNS, IPX, DECnet Phase IV, AppleTalk Phase II	CompuServe and WiTel	\$4,745 to \$8,945/Now
	NETBuilder Token Ring	Bridge/router	Up to 16M/9.6K to 7.1M	LMI, Annex D and FECN/BECN	NA/Up to 7.1M	Bridging, TCP/IP, OSI, XNS, IPX, DECnet Phase IV, AppleTalk Phase II	WiTel	\$6,959 to \$13,000/Now
	NETBuilder II	Bridge/router	Up to 100M/9.6K to 9.2M	LMI, Annex D and FECN/BECN	NA/Up to 7.1M	Bridging, TCP/IP, OSI, XNS, IPX, DECnet Phase IV, AppleTalk Phase II	CompuServe and WiTel	\$10,745 to \$32,000/First quarter
TIL Systems, Ltd. Toronto (416) 869-1157	Framework	Access	56K, 64K and 256K/NA	Annex D	NA/2 256K ports	NA	Testing not yet completed	Not available/Second quarter
Wellfleet Communications, Inc. Bedford, Mass. (617) 275-2400	Feeder Node; Link Node; Concentrator Node; Backbone Node	Router	56K, 64K, 256K, 512K, 1.536M, 2.048M and fractional T-3	LMI, Annex D, IETF RFC, ANSI T1.617, T1.618 and CCITT equivalents	NA/6M	X.25, TCP/IP, DECnet, XNS, IPX, SDLC, HDLC and AppleTalk	CompuServe and WiTel, under testing with BT North America	Starts at \$6,995/Now

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SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 32)  
 cuss the methods by which carriers set their prices. Each carrier has a different pricing approach. The one common element is that all carriers offer fixed-rate pricing by PVC, which is also known as Permanent Logical Links. US Sprint also offers a Standard Service, which is usage-based, but does not offer CIR. There are also many philosophies concerning the price sheets and tariffed rates. WiTel claims that it sticks to its rate table without exception and does offer revenue plans that can reduce costs

by as much as 52%. These, however, are not flexible. CompuServe also sticks closely to its rate table, and BT North America currently has one fixed price of \$2,100 per link, which includes local access. Even within these more standard pricing schemes, there are hardware support issues that can make pricing less clear. US Sprint and MCI will go outside their tariffed pricing for some customers and even include frame relay in Bulk Service Arrangements. AT&T takes a different tack. It

offers frame relay under custom contracts. In theory, this is a reasonable idea because customers are able to set their own service parameters under those arrangements. For example, a customer with a highly interactive application could specify a low network delay. But, in practice, a custom contract is likely to cause considerable delay in the overall sales and installation time. WiTel also offers service under a custom contract, but its terms are rather straightforward and follow the form of tariffed

pricing. Users should base all pricing comparisons on projected monthly and annual costs for each carrier's service. Make the carrier create a projected monthly or annual usage plan for your firm, using your own current or projected traffic figures with all relevant costs. **Herculean support** Another important issue is the level of customer support offered by each carrier. The carriers offer different packages of support services, including total network de-

sign and maintenance, so potential frame relay customers have to make clear exactly what the carrier will be expected to do. For example, because a frame relay network is a volatile environment, some early users have encountered problems when running multiple protocols over frame relay. It is vital, therefore, that the support team is able to handle implementation capably. Frame relay implementation involves new hardware as well as service. Troubleshooting may prove to be difficult because car-

(continued on page 37)



# Frame relay services

Carrier	Service	Carrier-provided CPE	Access speeds (bit/sec)	Port connection speeds (bit/sec)	CIRs on port connections/ Oversubscription allowance (bit/sec)	Customer network management terminal	Pricing	Service availability	Combined billing and management with other services	Platform/ Backbone protocol	Fairness doctrine
AT&T Bedminster, N.J. (800) 247-1212	Inter-span Frame Relay Service (limited availability, 1Q; general availability, 2Q)	Yes, all options are under evaluation and may be bid on an individual case basis	56K/64K, fractional T-1, T-1.5	56K, 64K, 128K, 256K, 384K, 512K, 768K, 1.024M, 1.536M, 2.048M	32K, 64K, 128K, 256K, 384K, 512K, 768K and 1.024M/All commonly needed port and CIR combinations are supported; others are negotiable	Performance analysis, configuration display available 2Q; first with SNMP support	Flat rate per month per location; rates have not been announced; price is based on port speed and CIR of the connections between ports. Options include access coordination and integrated access.	Domestic: 100+ cities; International: global international access available but no international POPs until demand materializes	Billing will be integrated with Accunet Digital Services family; customer network management feed to Accumaster Integrator and other industry-standard network management systems	StrataCom, Inc. IPX 32/Fast packet	The IPX implementation inherently provides congestion avoidance in the network. Specialized proactive capacity management systems monitor traffic to ensure timely capacity expansion, thereby minimizing congestion. All customers are treated equally.
BT North America, Inc. San Jose, Calif. (800) 872-7654	BT Express-LANE Service	Yes, the company provides all of the elements necessary to connect via frame relay, including CSUs and routers	56K/64K (higher speeds are planned for 4Q)	56K/64K (higher speeds are planned for 4Q)	56K/64K/ Minimal oversubscription allowance; Phase 2 (due 4Q) will incorporate congestion control and management mechanisms	Current network management plans incorporate call frame relay element under the Concert umbrella (due 4Q)	Flat rate of \$2,100 per month per location, which includes dedicated port access, software, bridge, router, 56K/64K access line (up to 60 miles from the nearest frame relay transmission switch; at a lower price, the bridge/router is optional)	Domestic: 180 cities (1Q); International: U.K., Paris, Germany (1Q), the Netherlands (1Q)	Phase 2 will incorporate some billing and management functions (4Q)	Tymnet network/ Frame relay	Customers first on the network have priority over customers just coming on to the network. Also, the company uses CIR and discard eligible bits.
CompuServe, Inc. Columbus, Ohio (800) 433-0389	Frame-Net Service	Includes the order, installation and support of the dedicated access line and the DSU/CSU on the customer premise. CompuServe will be providing frame relay routers in conjunction with Frame-Net for interested customers	56K or T-1 circuits	56K, 256K, 1.024M and fractional T-1 (1.544M access due 2Q)	4K up to 512K in 4K increments/ Allows oversubscription up to 200%	Offers a terminal-based network management system that ties into its Network Control Center to streamline access to technical support and trouble reporting systems. In conjunction with its platform supplier, CompuServe is currently investigating the development of an expanded system for Frame-Net customers.	Flat rate per month per location; includes order and maintenance of the local-loop connection and DSU/CSU, as well as management of the network and backbone capacity. Location cost is a function of the frame bandwidth allocation (the sum of the speeds of all PVCs on any access line), and the access line speed; nominal surcharge for sites more than 1,800 miles from the point of origin; under its PACE-SETTER program, customers pay special flat fee that covers access for the first 3 sites connected to the service; fee includes installation, monthly fees and circuit charges for first 2 months of use	Domestic: anywhere in the U.S.; international: Frankfurt, Germany, London and Toronto will be the first target cities internationally for Frame-Net support this year	Currently investigating ways of providing real-time statistics and network management through frame relay connections. More information will be released in 2Q	StrataCom IPX 32/Fast packet	When congestion occurs, it is managed through the adherence to CIRs or the momentary buffering of inbound data
Infonet Services Corp. El Segundo, Calif. (310) 335-2600	INFOLAN Frame Relay Service	Cisco Systems, Inc. and Network Equipment Technologies, Inc. Other options are under evaluation on an individual case basis.	56K/64K, fractional T-1, T-1, fractional E-1, E-1	56K, 64K, 128K, 256K, 384K, 512K, 768K, 1.024M, 1.536M, 2.048M	32K and 64K/Others are negotiable/To be decided	In development	Flat rate per month per location; price is based on port speed and the CIR of the connections between ports. Options include access coordination and integrated access.	11 countries, including the U.S., where service will initially be available in 7 cities (commercial availability is scheduled for October)	Billing will be combined with Infonet's existing INFOLAN IP service	NET IDNX Packet Exchange/ Frame relay	NET capacity planning tools; Backward Explicit Congestion Notification, Forward Explicit Congestion Notification and discard-eligible bit enforced congestion management; certification program in development
MCI Communications Corp. McLean, Va. (703) 506-6060	MCI VPDS Frame Relay (due 2Q)	Yes, MCI will provide routers, bridges, frame relay assemblers/disassemblers	56K/64K, fractional T-1, T-1	56K/64K, fractional T-1, T-1	Nx56/64K/Yes	Yes, details to be announced in 2Q	Will offer both flat rate and usage-sensitive	Domestic: all 300+ MCI POPs (2Q); international: details to be announced in 2Q	Billing can be combined with other MCI data services	Wellfleet Communications, Inc. and Siemens Stromberg-Carlson equipment models are proprietary/ Cell relay (1)	Discard-eligible bit and CIR; congestion avoidance is done through sophisticated MCI network capacity management
US Sprint Communications Co. Kansas City, Mo. (800) 736-1130	Sprint Frame Relay: Standard Service and Reserved Service	Yes, equipment includes an OEM of Wellfleet Communications, Inc. router; Sprint will sell or lease all equipment necessary to connect to the service, however, the CPE is not packaged with the equipment at this time	56K/64K, fractional T-1, T-1	56K/64K, 112K/128K, 224K/256K, 336K/384K, 448K/512K, 672K/768K, 896K/ 1.024M, 1.344M/ 1.536M	19.2K, 64K, up to 1.024M in increments of 64K/Yes	US Sprint proprietary TP5000 terminal	Standard Service: usage-based, distance-insensitive charges with a cap on total charged; Reserved Service: fixed charge based on permanent logical link, port charges are additional. Can only subscribe port up to 70%.	Domestic: All US Sprint POPs (over 200); international: initial plans called for unilateral service to London and Japan, but current strategy looks toward international alliances	Billing can be combined with other US Sprint international services, such as X.25 packet service	TP4900/ Proprietary protocol based on Q.931	CIR has no priority; sophisticated congestion avoidance

CIR = Committed information rate  
CPE = Customer premises equipment  
CSU = Channel service unit  
DSU = Digital service unit  
POP = Point of presence  
PVC = Permanent Virtual Circuit

FOOTNOTE:

(1) Cell relay will also support Switched Multimegabit Data Service in the future. Cell-based backbone will facilitate migration to Asynchronous Transfer Mode and broadband ISDN.

This chart includes a representative selection of frame relay services. These carriers may offer other such services, and other carriers not included may offer a full range of comparable services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.



# Frame relay services

Carrier	Service	Carrier-provided CPE	Access speeds (bit/sec)	Port connection speeds (bit/sec)	CIRs on port connections/ Oversubscription allowance (bit/sec)	Customer network management terminal	Pricing	Service availability	Combined billing and management with other services	Platform/ Backbone protocol	Fairness doctrine
US West, Inc. Englewood, Colo. (206) 346-9798	To be decided	US West will provide a CPE capability, including bridges, routers and CSUs. The details of the hardware program are now being completed.	56K/64K up to DS1 increments of 64K	56/64K, 256K, 384K, 512K, 768K, 768K, 1.563M	Nx64K/Yes, limited by customer-specific design review	Under consideration	Initially flat rate; usage-based planned	Domestic: 14 cities with flexible provisioning arrangements	To be decided	To be announced/ Cell-based protocol	Congestion will be based on CIR weighting
Wiltel Tulsa, Okla. (800) 642-2299	WilPak	Wiltel will provide all elements necessary to connect frame relay service, including local access CSU/DSU router	56K/64K, fractional T-1, T-1	56K, 256K 384K, 512K 768K, 1.024M (1.544M and 2.048M planned this year)	PVC CIRs include all 56K/64K increments/ Oversubscription allowed up to 200%	Under development (due this year)	Monthly flat rate per location based on the port connection speed and the amount of connectivity from that port; cost is not usage- or mileage-sensitive	Domestic: 171 POPs (94 standard; 77 additional on individual-case basis); International: under evaluation	Several Wiltel services can be combined with WilPak for billing purposes, such as private lines and WilBand	StrataCom IPX/Cell relay	Proactive congestion management through momentary burst capability. Wiltel's philosophy is to delay, not discard.

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SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 35)

riers have found deficiencies in some hardware implementations.

Most carriers are in the process of finalizing cooperative agreements with hardware vendors to resell or lease routers and other equipment necessary for frame relay hookups. Wiltel has begun to offer preconfigured Cisco Systems, Inc. routers, while BT North America offers installed equipment as an optional part of the basic fixed-rate package.

Other factors in making a vendor choice will be geographic availability and whether the carrier offers the required access speed. Customers will have to consider varying access charges and availability of access for all locations.

Most carriers claim service from 100 or more points of presence. For instance, AT&T will offer service to over 100 cities by midyear, when its Interspan

frame relay service will be in full release. But in many cases, carriers will need to back-haul access circuits to frame relay switches. This practice can degrade performance and add to network delay, which is debilitating to interactive applications.

Carriers have quoted as much as 100 msec as an overall network delay objective. Customers coming from low-delay T-1 networks will have to be wary of sales teams minimizing this issue.

Access costs will vary based on the distance of the local loop required to connect to each interexchange carrier. The one exception to this otherwise universal rule is BT North America, which includes local-loop charges in its fixed \$2,100 per link charge provided the local loop is 60 miles or less.

Access integration tilts the equation in favor of a current dedicated service provider because customers can simply dedi-

cate channels in existing T-1 circuits to be used for frame relay services without the added cost or loss of implementation time in ordering new access circuits.

Access speeds vary substantially among providers. BT North America's service is only available at 56K/64K bit/sec, and the carrier will not add higher speeds until the fourth quarter. Carriers using StrataCom's IPX multiplexer as their frame relay switch, including AT&T, CompuServe and Wiltel, have only recently been able to offer full T-1 speed.

## Sorting it all out

To review, these six key areas differentiate between the available services and will determine the optimal provider for each user: present carrier relationships, network management, pricing, level of support, service availability and equipment support.

A good way to begin the search

is to talk with your current provider of private-line, virtual network or X.25 service. Doing so could be the first step in getting the lowest price. Most private-line providers have revenue and term plans that include frame relay now or in the near future. Savings through these plans can be as much as half off base rates.

And remember, the Big Three interexchange carriers and Wiltel will be able to minimize access costs by enabling users to access frame relay and other services — such as virtual networks, private lines and 800 lines — on a single T-1.

Despite its promise, frame relay is not perfect. Many issues have been glossed over in the rush to market, especially congestion management.

Nevertheless, frame relay will continue its rapid maturation, with some significant improvements. Switched virtual connections will come into being — pos-

sibly in 1993 — making frame relay a true switched data service.

Carriers will also be looking to beef up their frame relay networks and to add packetized voice and video to their capabilities. At least two carriers, AT&T and US Sprint, will be following MCI and installing T-3 backbones, and many of the carriers will be increasing customer access speeds beyond T-1.

If frame relay can overcome the remaining questions regarding congestion management and compatibility among services and hardware, it will thrive through 1995. By then, higher speed services will come to market; the real question is whether applications will be driving them the way they are driving frame relay.

Carriers see frame relay as a migration path to higher level services. And yet, frame relay is still likely to be the data communications workhorse of the mid-90's. □

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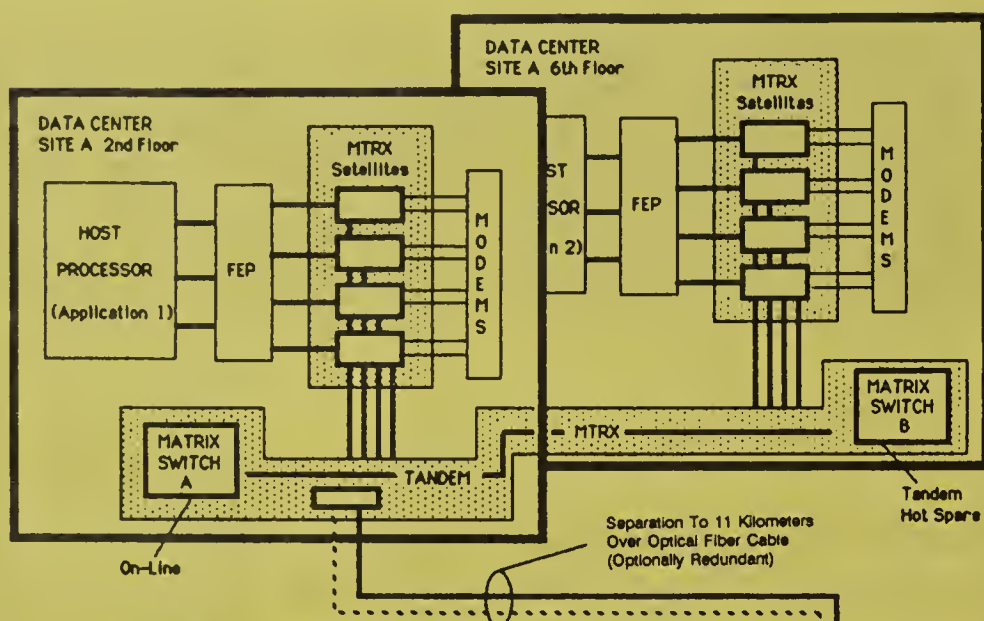
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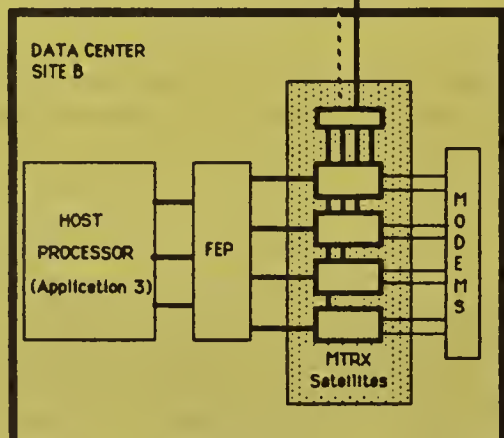


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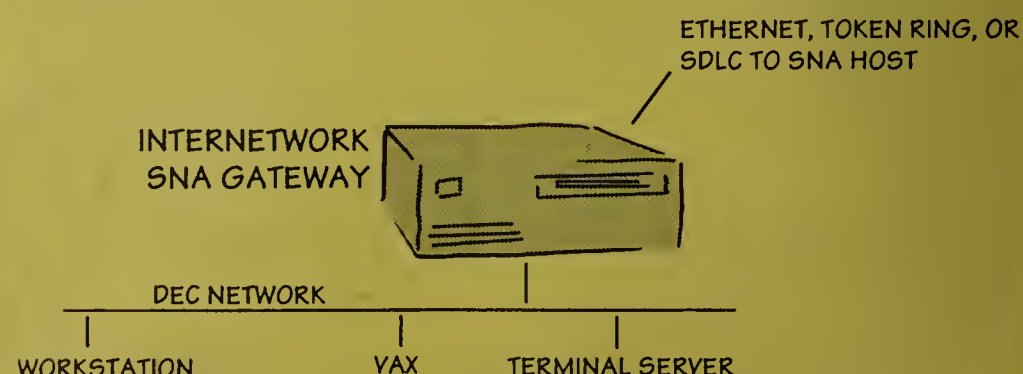
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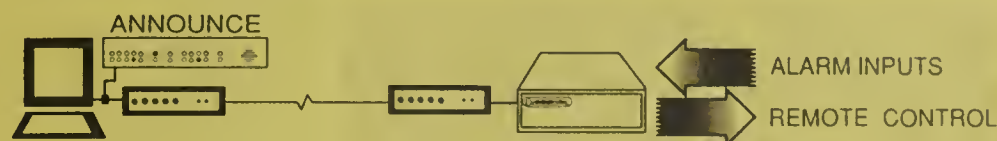
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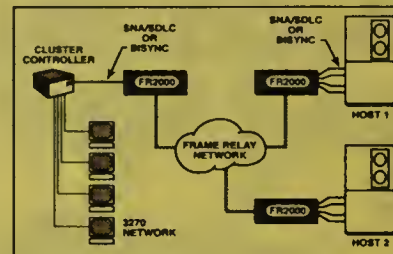
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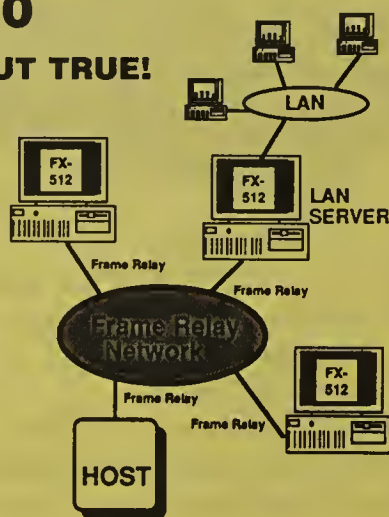
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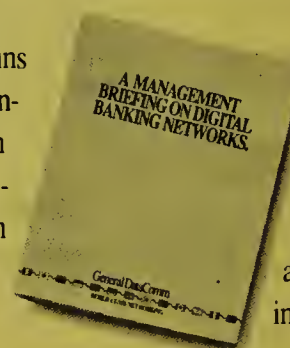
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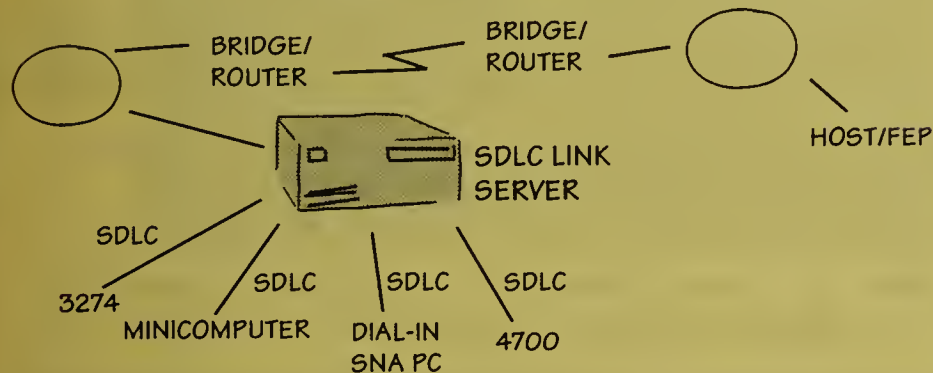
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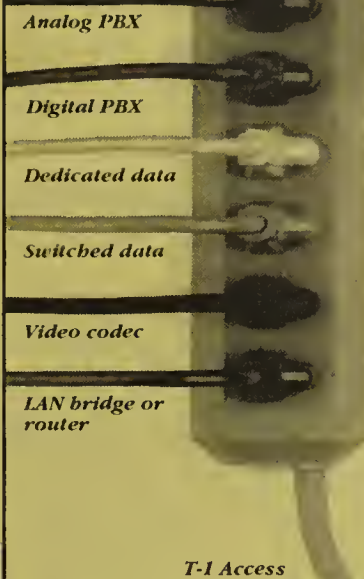
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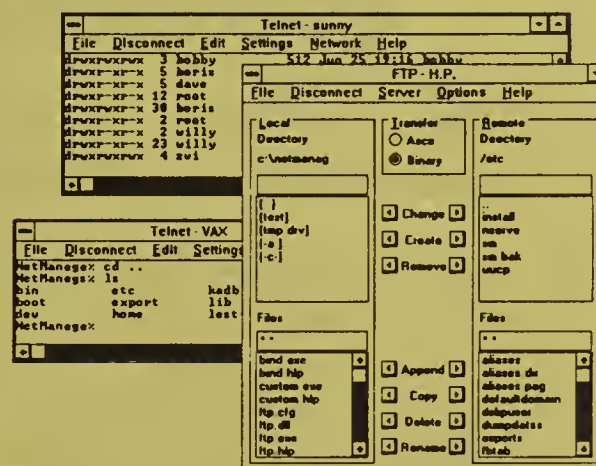
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By Paul Longoria

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Feb 17 (Feb 5 Close); Topic: Internetworking; Guide To Strategic Purchase Decisions: Outsourcing

Feb 24 (Feb 12 Close); Topic: WAN; ACD options; Lead Service

Mar 2 (Feb 19 Close); Topic: LAN; Buyer's Guide: LAN E-mail (X.400 and otherwise)

Mar 9 (Feb 26 Close); Topic: Global Networks; Selecting an international hub; Show Distribution: DCI Downsizing/Cebit; Lead Service

Mar 16 (Mar 4 Close); Topic: Internetworking; Computer Integrated Manufacturing (CIM) strategies; Show Distribution: ENE '92

Mar 23 (Mar 11 Close); Topic: WAN; Buyer's Guide: Virtual network services; Lead Service

Mar 30 (Mar 18 Close); Topic: Applications; Analysis of the Open Software Foundations's (OSF) DCE and DME; Harvey Study

Apr 6 (Mar 25 Close); Topic: LAN; 1. Buyer's Guide: LAN servers 2. Multimedia and networks; Show Distribution: Comdex Spring; Lead Service

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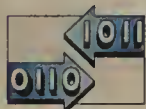
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## ATM emerging as transport

*continued from page 1*

most everybody who has a pulse will have ATM," McQuillan explained.

### Natural advantages

Forum officials claim ATM has several advantages over other technologies. For one, ATM can run at speeds ranging from 51M to 1.2G bit/sec, which is more than adequate to support both LAN and WAN traffic.

Additionally, ATM switches can be easily changed to deliver any bandwidth that a user requires. For example, ATM switches could be engineered to deliver 7M bit/sec of bandwidth on one LAN, 11M bit/sec on another and 90M bit/sec on a third. By contrast, most existing LANs operate at fixed bandwidths.

The technology is also better able to support multimedia traffic because it is based on fixed-sized, 53-byte cells and can accommodate both connectionless and connection-oriented traffic. Most LANs, however, only support connectionless links, which do not support interactive voice and video traffic efficiently.

Finally, ATM Forum officials

say the technology will simplify network management by enabling users to deploy a common transport technology in LAN, WAN and voice environments.

"Our view is that ATM is the mother of all networks," said Joseph Marmion, Northern Telecom's director of market development in Richardson, Texas. "For the first time, you will be able to have LANs, MANs and WANs communicate using the same technology."

The forum hopes to bring this dream to fruition by developing interoperability standards for ATM-based customer premises equipment and for routing ATM traffic over standard LAN cabling, including shielded twisted-pair and multimode fiber-optic cabling, said Charles Giancarlo, marketing vice-president at Adaptive in Redwood City, Calif.

"ATM standards are 98% finished," he said. "We aim to work on the remaining 2%."

Last week, Giancarlo was elected to the ATM Forum's board of directors. The forum also elected Geoffrey Baehr, director of advanced networks development at Sun, as president of the consortium.

McQuillan said the migration to ATM will be faster than most

users realize. Starting this year and in 1993, at least a half-dozen LAN vendors will unveil ATM-based hubs that will make it possible to build campus or office ATM backbones, he said. These backbones will be able to support token-ring, the Transmission Control Protocol/Internet Protocol or Ethernet subnetworks.

### Future vision

McQuillan predicts that by the end of 1994, computer makers, such as Sun, will start rolling out high-end workstations and servers with ATM interfaces.

Finally, in 1994 and 1995, users are likely to start building ATM-based private WANs and carriers will begin to roll out ATM-based public network services.

Some users are already prepping for this future. Jeff Marshall, Bear, Stearns' managing director of information systems, said in a speech to the ATM Forum last week that the brokerage firm plans to install ATM-based LANs in 1993. In subsequent years, it wants to deploy ATM throughout its global network.

Jim Opfer, a U.S. Air Force colonel in charge of networking, said the service branch also wants to deploy ATM technology throughout its network. ■

## Battle shaping up for WARC

*continued from page 4*

place telecommunications in developing countries," Baran said.

Most countries participating in WARC have submitted their government's positions to the International Telecommunication Union (ITU), the United Nations body convening the WARC meeting.

But due to the time lag for translation, processing and distribution, few documents are publicly available.

Christian Schwarz-Schilling, minister for Germany's post and telecommunications, last week said his country supports the U.S. proposal with some reservations. "We have some problems with the downlinks because [those frequencies] are already used for other services in Germany," he said.

Bill Gorman, Motorola's vice-president and director of global spectrum management, said that without a new global frequency allocation, it would be difficult — if not impossible — to establish the Iridium network. "The alternatives are not attractive," he said. "We need [radio] bands so we can start now and for future

expansion."

For the U.S., a difficult part of WARC will be trying to convince the Europeans that a specific allocation between 1.9 GHz to 2.025 GHz and 2.11 GHz to 2.2 GHz is not needed for "future public land mobile telecommunications systems," the ITU's phrase for PCNs.

Instead, the U.S. delegation will advocate flexibility on new PCN bandwidth allocation, arguing that countries today have the power to use existing frequencies for PCNs or other technologies as they see fit.

According to a document released last week, the position taken by 24 European countries is that a global PCN allocation is necessary to get "the advantages of compatibility, access and cost reductions, due to the large-scale production that would result."

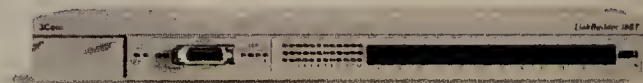
But the U.S., despite recent Federal Communications Commission actions that may evict microwave users from the 2-GHz range, is not moving as quickly on PCNs as the Europeans are.

Baran said the U.S. would entertain all suggestions for a roaming allocation, but he noted that the U.S. is not as constrained as Europe to make an immediate decision on PCNs. ■



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Best of all, perhaps, you can turn an unmanaged stack of LinkBuilder 10BTs into a managed stack with astonishing ease.



## Novell offers software

*continued from page 4*  
tocols," he said.

Eventually, the routers will be managed by IBM's NetView or a Simple Network Management Protocol-based central management console, Jain said.

"We want to stress that this is a basic entry-level product," Jain said.

"It is not to be compared with Cisco [Systems, Inc.] or Wellfleet [Communications, Inc.] routers," he said.

However, he compared the \$995 cost of Novell's router to the price of other dedicated entry-level routers, which can cost almost twice as much as Novell's offering. The NetWare Multi-Protocol Router Version 1.0 will be available later this month.

### Hub hubbub

As expected, Novell, in conjunction with the router, unveiled its NetWare Hub Services Version 1.0 — a series of NLMs that enable users to manage hub cards resident in NetWare 3.11 servers ("Pack to control hub cards in NetWare server," *NW*, Jan. 27).

NetWare Hub Services is expected to be available next month

and is priced at \$250.

Compaq and Novell became closer bedfellows last week with the signing of a Master Business Agreement that outlines new areas of cooperation on product development, net management and network dependability.

### SFT effort

The two companies said they will work to complete NetWare System Fault Tolerant (SFT) III server mirroring technology. When finished, Compaq will bundle the software on its SystemPro network servers.

"The SFT III effort is ongoing," said John Edwards, director of marketing for Novell's NetWare Products Division, based in Provo, Utah. "[The product] will come out this year."

Analysts said Compaq will likely preconfigure its hardware with NetWare for those customers that require it.

On the net management side, analysts at The Burton Group, a consulting firm based in Salt Lake City, speculated that Compaq will build network management applications based on Novell's soon to be released NetWare Management System and include these applications with its network servers, as well. ■

## SPAG devises tough program

*continued from page 1*

Marks to products that pass a battery of conformance and interoperability tests. The PSI Mark will assure buyers that the OSI product will work with at least three other products.

Although the program will be announced in Europe, SPAG hopes to establish similar efforts in the U.S. through organizations such as the Corporation for Open Systems International (COS).

According to Patrice d'Oultremont, SPAG's director, the PSI program represents a fundamental shift in the way vendors develop OSI products. He said it will go beyond interoperability testing by giving SPAG a voice in vendor product development.

For instance, instead of using their own product profiles to develop an X.400 offering, vendors will use a common profile issued by SPAG. The profile defines a list of services — adhering to the specific OSI standard — that would be offered to users.

"You cannot achieve interoperability unless products are designed and developed with interoperability in mind," d'Oultremont said.

Conformance testing, which today is backed by COS in the U.S., ensures conformance to a standard, but does not guarantee interoperability due to differences in the way vendors develop their product profiles.

"This problem is so difficult to resolve, we want to go step by step to gain confidence that the solution we put there will work," d'Oultremont said.

SPAG has only issued an X.400 product profile to date but plans to issue others for development of File Transfer, Access and Management (FTAM) and network management products.

Vendors wishing to earn the PSI Mark for a product must first submit a definition of the proposed product based on the SPAG profile. SPAG will either approve the project or ask for revisions.

"Vendors have to show us what they will do before they build it," d'Oultremont said.

After a vendor gets the go-ahead and creates the product, a battery of conformance and interoperability tests follows.

Eva Kuiper, OSI standards consultant at HP, said the PSI approach is good because it places an emphasis on defining user service requirements. HP is among a half dozen SPAG members whose

products are now undergoing review in the last stages of the PSI pilot test for X.400.

The X.400 products earning the PSI Mark will be announced March 26 during the introduction of the PSI initiative, d'Oultremont said. If the X.400 pilot is not successful, SPAG will postpone the announcement. "We're on a learning curve," d'Oultremont conceded.

The timing of SPAG's PSI announcement is intended to coincide with the release of the European Procurement Handbook for Open Systems (EPHOS), which European government procurement agencies will use as a guide for buying open systems.

The release of EPHOS will mark the official start of Europe's voluntary OSI product procurement program — another compelling reason to achieve interoperability in OSI products.

Keith Willetts, a product manager at British Telecommunications PLC, a SPAG member, called PSI "a very ambitious project." But he added that the expense of running the program may grow too heavy for SPAG itself.

"The only way PSI will succeed is if it gets financial backing from the European Community," Willetts said. ■

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## User analyzes bridge/router

continued from page 1

by IBM, which led to a number of question-and-answer sessions, providing the basis for this article.

From the information given to us, The Travelers believes the 6611 is a feature-rich product that meets many of the requirements voiced by the company as well as other firms during the past year ("Early user's view of NET's new LWX router," *NW*, June 24, 1991).

Of great interest to IBM customers is the 6611's ability to route Systems Network Architecture and the Network Basic I/O System, both considered difficult to route because neither of their addressing schemes has a built-in routing structure.

In addition, the 6611 not only routes SNA and NETBIOS, but it has a "fire wall" — a barrier preventing most local-area network overhead from entering the wide-area network.

The 6611 also provides a solution for handling non-IBM protocols such as the Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX) and Xerox Corp.'s Xerox Network Systems, which have recently been gaining importance in traditional IBM shops.

The 6611 also implements such cost-saving features as Synchronous Data Link Control and IBM Remote Bridge termination, which provide the savings gained by aggregating bandwidth and equipment, respectively. The 6611 even provides an interface to meet the fast-growing frame relay requirement.

All this is included in IBM's first router release. It seems almost too good to be true. Can users receive these features and still get the high-performance levels needed?

The Travelers' current LAN internet is built on bridges. We are naturally interested in a router, because a router's features can reduce costs. But the router we choose must not degrade the network, and its users must not notice a service loss. File transfers, for example, must not run noticeably slower after a conversion from IBM bridges to the 6611.

What then is the 6611's performance level? So far, IBM's only statement is that the 6611 will drive a full T-1 circuit. According to the company, complete performance figures will not be released until the product is generally available in June.

The 6611 hardware is designed for high performance. Its main processor and each of its interfaces are Reduced Instruction

*Simon is a telecommunications engineering project manager at The Travelers Corp. in Hartford, Conn.*

Set Computer (RISC) processors. All bridging, frame relay conversion and forwarding of routable protocols is done on these interface cards.

This allows frames from different sources to be concurrently transmitted either card-to-card, or card-to-bus-to-card without requiring interrupts on the main CPU. Most other routers on the market force every message through their main processors, with all of them competing for the same processor cycles.

When the workstation looks for its server, it sends out another batch of broadcasts. SNA generally uses all-route broadcasts, which, in a meshed network, can result in many copies of the same broadcast arriving on every ring in the network.

Overall, 10% to 20% of the messages in The Travelers' network are broadcasts. This puts a drain on network bandwidth, which could otherwise be used for productive messages.

In addition, sudden broadcast

server outage can impact many active sessions.

In such a situation, the 6611 will block a flood of return broadcasts attempting to obtain the same unavailable course. Without this feature, these attempts to reinitiate sessions could create broadcast storms throughout the network.

Previously, The Travelers tested an early version of Network Equipment Technologies, Inc.'s LAN/WAN Exchange (LWX), which was based on Cisco's software. In this implementation, every broadcast or nonbroadcast message resulted in an update of the token-ring address table.

We learned from the LWX that a large address table detracted from performance because, at larger sites in The Travelers' network, the table can become quite extensive.

In the 6611, this table lookup is done in the main RISC processor. Here too, the token-ring address-resolution process on the 6611 is likely to have some impact on performance. However, this effect could be mitigated by the power of the RISC processor and the table search/update algorithms.

### The ready piranha

Another unique and valued DLS feature is session termination for 802.2 Logical Link Control 2 (LLC2). One of the inherent properties of a session is end-to-end control between partners.

End-to-end controls are used to handle congestion, transmission errors and node failure noti-

es are small in size, they are great in number and like piranha to bandwidth. About 30% of LAN interconnection network bandwidth can be consumed by this type of session overhead.

The IBM 6611 acts like an end point to the LLC2 session. That is, receiver-ready frames terminate at the router. Notification of congestion, frame errors and node failures are passed on exception.

So far, LLC2 termination appears to be another unique feature of the IBM 6611, although Cisco has announced that it intends to provide some of this function in a future release. We expect this feature can reduce session overhead to a trickle, compared to the previous flood of receiver-ready responses.

### The bridge comparison

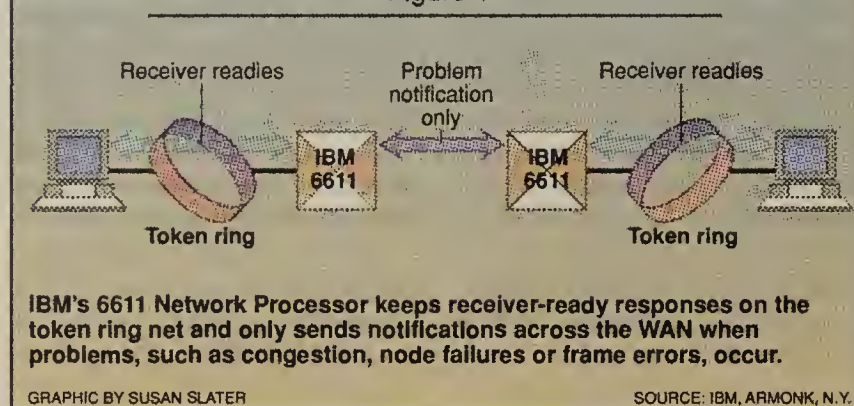
End-to-end performance may be improved with the 6611 because message acknowledgments can come from the local router rather than a session partner that may be on the other side of the network.

However, there's a negative aspect to this configuration. In a bridged network, there is only one session between two end points. In a 6611 router-based network, the single session, as it appears to the end points, is actually broken into three parts.

Yet another unique DLS feature is SDLC termination. This is not the same as SDLC "tunneling," which merely envelopes SDLC messages in TCP/IP. Rather, the SDLC header is stripped off at the router. The message is

## How the 6611 helps terminate session overhead

Figure 1



Thus, the 6611 has some factors likely to improve its performance in handling routable protocols.

Because of the 6611's SNA and NETBIOS capabilities, the router is likely to have a favorable impact on the network. We are particularly interested in its data link switching (DLS) feature.

DLS can significantly reduce network costs by dramatically cutting the overhead associated with SNA and NETBIOS in a large interconnected token-ring network. DLS will also enable users to merge older SNA SDLC circuits on the router with LAN traffic for more efficient use of WAN circuits.

However, DLS is likely to have an impact on the 6611's performance. All the DLS features that distinguish this product from most of IBM's competitors are resident on the main CPU (see "The 6611's basic features," page 47) and not on the interface cards. Thus, DLS messages will compete against each other for processor cycles.

### The 6611 fire wall

The most critical DLS feature that the 6611 could bring to The Travelers' large network of interconnected token rings is its fire wall, which prevents source route bridge broadcasts from flowing onto the WAN.

In source route bridged networks, every broadcast reaches every ring in the network. NETBIOS relies heavily on broadcasts to provide its services, which can lead to considerable overhead. For example, every time a workstation running NETBIOS is started, it sends out six broadcasts by default, just to be sure its name is unique.

growth in one network region can result in congestion, even at the opposite end of the net. Lower bandwidth circuits, generally connecting to smaller sites, are particularly vulnerable to congestion because broadcasts use a higher percentage of capacity.

However, the 6611 creates a fire wall against these broadcasts by maintaining a table of token-ring addresses mapped to their destination. When a broadcast occurs, the table is used to route the broadcast messages to their destination, rather than allowing the broadcast to proliferate everywhere in the net.

Similar approaches are used by other router vendors such as Cisco Systems, Inc. These implementations work by learning the location of a token-ring address after recording information from the first broadcast into a table. The routers then use this information to block subsequent broadcasts to the same address from going to nondestination routers.

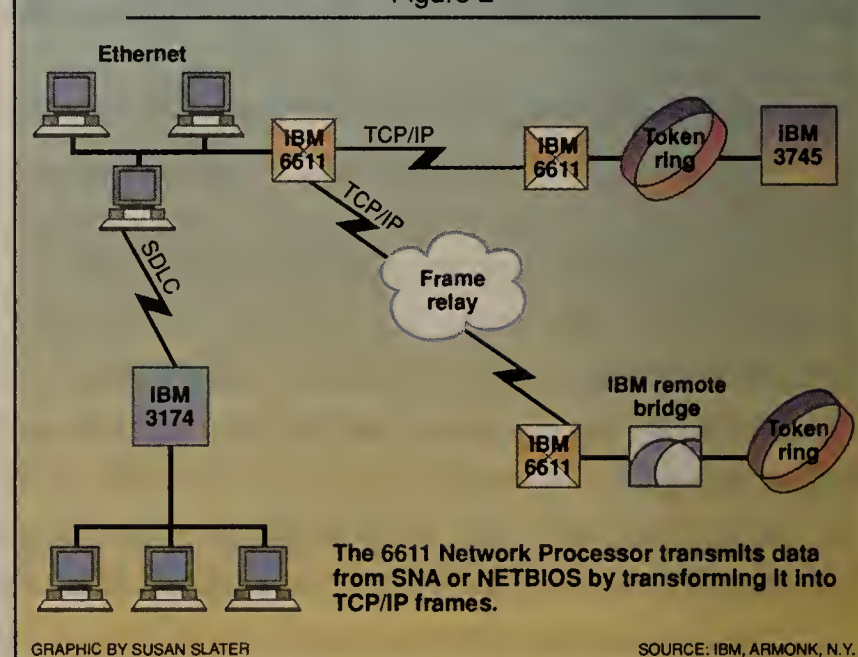
However, these approaches mainly deal with source route bridge broadcasts. IBM appears to be the first vendor to have built a fire wall against NETBIOS broadcasts. This is difficult because NETBIOS uses the same token-ring address in every broadcast.

Another hot feature in the 6611 is that it improves problem isolation in an outage/recovery situation.

According to IBM, the 6611 will buffer broadcasts to the same token-ring address (or NETBIOS name) until the first broadcast is returned with a positive response. This feature will be important to companies such as The Travelers because an IBM 3745 front-end processor or large LAN

## How the 6611 works with TCP/IP

Figure 2



fication between session partners. These partners, such as workstations and servers, manage these controls using 2-byte frames called receiver readies.

By default, every message sent gets a receiver-ready response. Every idle session partner will send such as response somewhere between every three to 60 seconds, depending on the application, to tell its partner it is still active (see Figure 1, this page).

While receiver-ready respons-

transported with TCP/IP to the destination router, and at that point, the TCP/IP header is removed and a token-ring header is added. Also, polling is local to the SDLC device (see Figure 2, this page).

This saves cycles in the IBM front end and saves the bandwidth required to transport the polls across the WAN. This is because — after the originating router converts SDLC into TCP/IP — SDLC and LAN traffic



## Bell Atlantic files SMDS tariff

*continued from page 2*

The GSA is using dedicated T-1 circuits to connect Wellfleet Communications, Inc. routers on Ethernet local-area networks to an SMDS switch at 1.17M bit/sec.

The SMDS switch routes the traffic to a second GSA location, although it is possible for the switch to establish multimegabit links on demand to SMDS switches serving other locations.

The GSA is using the service to give recently relocated employees to the government printing plant at the old location. The site has about 250 computers on three separate Ethernet LANs transmitting database information and electronic mail to the printing plant. Spaulder said that, in the future, the GSA may increase its network to between 10 and 15 sites.

Spaulder said Bell Atlantic is currently negotiating with long-distance carriers to conduct trials

of long-distance SMDS this year. She declined to name the carriers to whom Bell Atlantic is talking.

### Flat-rate pricing

Bell Atlantic's pre-SMDS service is initially priced at \$500 per month for each subscriber interface, plus a onetime connection charge of \$850 per line. When the full SMDS service is available, prices will be \$800 to \$900 per month, Spaulder said.

Bell Atlantic made the decision to sell a limited service at a flat rate to gain market experience. "If you're selling someone a substandard service, you should give them a discount," Spaulder said.

The full SMDS service, which should be available by the end of the second quarter, will be rolled out in the Washington, D.C. metropolitan area, Philadelphia, Pittsburgh and northern New Jersey, Spaulder said. No installation fee will be charged to existing customers converted to the new tariff. □

## BBN announces product suite

*continued from page 2*

The Reduced Instruction Set Computer-based T/10 will enable users to combine SNA, asyn-

chronous and bisynchronous terminal traffic with data from local-area network-based workstations and X.25 packet networks over a single link at up to T-1 speeds. The device can support as many as 8 T-1 links. It supports the Point-to-Point Protocol for interoperability with other vendors' routers.

"Today, customers are paying a lot for parallel circuits" to transmit LAN and X.25 traffic, said Lawrence Verner, BBN's director of marketing strategies.

The first release of the T/10 will support X.25 and SNA. Later this year, it will support the Transmission Control Protocol/Internet Protocol and Novell Inc.'s Internetwork Packet Exchange (IPX), as well as asynchronous and bisynchronous protocols. A third release will include frame relay support.

The T/10 can be managed from a Simple Network Management Protocol management system. It ranges in price from \$9,000 to \$25,000 and will be available this month.

BBN also introduced NetCheck, which runs on a Digital Equipment Corp. DECstation 5000 and can monitor a BBN packet-switched net.

NetCheck supports automated collection of management data and generates 12 diagnostic reports that provide information about network behavior and traffic patterns, enabling users to analyze network trends and plan for expansion.

The software is priced at \$30,000 and will be available in the second quarter.

BBN's new NetSave consulting services are designed to help customers develop network cost-reduction strategies.

NetSave is available now; prices begin at \$75,000. □

## User analyzes bridge/router

*continued from page 46*

can share the same bandwidth, which will allow networks to consolidate and use bandwidth more efficiently.

The Travelers estimates that there is a potential \$1 million in annual bandwidth savings for its network by converting SDLC to LAN-based traffic.

Of course, there is a price to pay for this feature: SDLC termination is also conducted on the main RISC processor. A typical multidrop SDLC line could have four 3174 controllers on it, in addition to 250 or more concurrent logical sessions.

Heavily used lines such as these generally are continuously polled, which may have an adverse effect on router performance. If it has good performance and the benefits provided by DLS, in my opinion, the IBM 6611 is sure to have an advantage over its competitors for installations in large networks of interconnected token rings. Lowering costs without sacrificing service is always good business.

On the other hand, if IBM's 6611 doesn't provide competitive throughput, its price/performance characteristics may be an

issue. If the 6611's throughput (generally measured in packets or bits per second) is lower than that of its competitors, nets using the 6611 could require installation of multiple routers in larger sites. This could reduce some of IBM's competitive advantage.

Of greater concern is the amount of latency that the 6611 could add to overall end-to-end network delay. In the days of short bursts of interactive traffic, higher latencies in the network were more acceptable than they are today. However, LAN users have become used to the low latency of bridges, and — with today's heavy data-transfer applications such as image transmissions and graphics — a significant increase in latency would be noticeable.

Given the amount of processing — for example, table lookup and header conversion — that needs to occur in the 6611's main processor for sessions using DLS, some increase in latency is possible, as compared to bridges.

The 6611's RISC processor and its way of terminating LLC2 sessions locally could help. But will the 6611 be fast enough so that customers do not notice the difference? This is the question we hope IBM will answer in June. □

## 6611's basic features

Although IBM has sold routers from other vendors in the past, the first one that it is actually making is the 6611 Network Processor, which was announced two weeks ago and is expected to ship in June.

The 6611, a multiprotocol router, is built on an IBM RISC System/6000 platform. It comes in two versions: the 6611/140, a shelf model with four slots, and the 6611/170, a seven-slot floor model.

Each slot can accommodate a token-ring port, an Ethernet port, two serial T-1 (RS-422) interfaces and an X.25 interface or a Synchronous Data Link Control adapter with either two V.35 or four RS-232 ports. The models use the same RISC processor and Micro Channel Architecture, and both work with the most recent IBM Token-Ring chipset.

The total base cost for hardware and software for the 6611/140 is \$9,995, while the 6611/170 costs \$18,640. The local-area net and serial interfaces cost \$3,350 each. The SDLC interface costs \$2,600.

With the 6611, IBM introduced a new routing function called data-link switching (DLS), which is a new way of routing packets that are sent under the Systems Network Architecture/Token Ring, SNA/SDLC and Network Basic I/O

System protocols. Under DLS, frames from these three protocols will be converted to Transmission Control Protocol/Internet Protocol frames, then routed through the the router network using the standard Open Shortest Path First protocol. This direct conversion to TCP/IP is different from the approach taken in other routers, which is to envelop the protocols into TCP/IP headers.

In addition to the three protocols handled by DLS, the 6611 will route native TCP/IP, Xerox Corp. Xerox Network System, Novell, Inc. Internetwork Packet Exchange (IPX) and Digital Equipment Corp. DECnet.

The ability to route Apple Computer, Inc. AppleTalk will be added in the future. On the serial interface, customers will have their choice of using IBM's bridging protocol, frame relay or TCP/IP.

The bridge protocol is compatible with IBM's Remote Bridge Version 2.2. This will allow customers to collapse as many as 12 IBM Remote Bridges onto a single router.

The product will also provide a Simple Network Management Protocol agent and support SNMP's Management Information Base I and II extensions, including protocol interfaces and fault management.

— Stephen Simon

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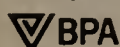
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